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PIPE LINE INDUSTRY

SEPTEMBER
1961

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38 Ideas for Maintenance

Side cutter wheels improve trenchers • Portable valve operator from air drill • Convert winch truck to dump truck • Feather strip cutter saves money • Light shows position of solenoid valve • Metal gasket template speeds pump removal . . . plus 32 more time and money savers

NEW LUBE SYSTEM

How to Reduce Engine Operating Costs 51

IMPROVED METERING

Automatic Provers for PD Meters 53

MODERNIZING STORAGE

Overhauling 134 Floating Roof Tanks 57

PIPELINER TOURS USSR

How Does USSR Gas Industry Rate? 59

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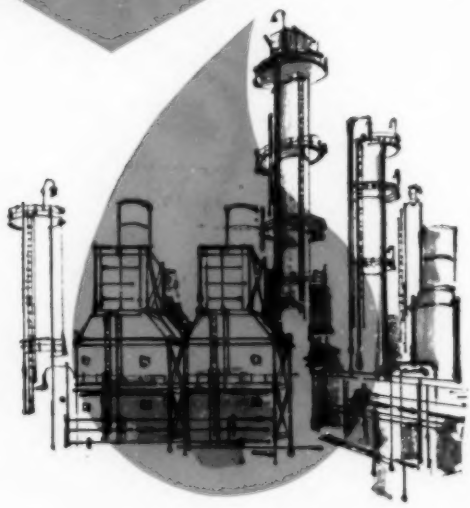

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WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW

PIPE LINE INDUSTRY

A GULF PUBLISHING COMPANY PUBLICATION

September 1961 Vol. 15, No. 3

CONTENTS and Quick Look

To help you put first things first, scan these time-saving digests, checking ☑ those you want to read first.

Something new!

Beginning with this issue, PIPE LINE INDUSTRY is being bound by a new process known as *slotted binding*. This process, made possible by a new adhesive technique, gives you a book that is easier to read because it will lie flat. At the same time, binding strength is maintained.

Compare this issue with previous issues of PIPE LINE INDUSTRY. Hold the issue up by a single page . . . it won't become detached. Now open the issue flat to any page. What space has been gained between the two pages will permit improved two-page presentations of editorial and advertising material.

Try tearing a page out of the magazine. With an even pressure, the page detaches easily. Notice that the wire staples have been eliminated completely.

This is another part of a continuing program of improvement that has made PIPE LINE INDUSTRY the best and easiest read magazine in the pipe line field.

We hope you like it.

Melvin A. Judah

Editor

38 Ideas That Can Improve Maintenance

☐ Enthusiastic reader response to last year's collection of maintenance ideas has prompted an expanded report this year. Some 19 companies have contributed 38 ideas this year and you'll find them starting on **Page 35.**

How the 'Pump-Down' System of Lube Oil Handling Saves Money

☐ By pumping down engine crankcases in rotation, using the oil in compressor cylinder lubricators, Tennessee Gas has eliminated oil waste. Moreover, less expensive oil will insure satisfactory lubrication. Another source of savings is that maintenance and operating labor is reduced greatly by this practice.

By Tracy S. Park, Jr. . . . . Page 51

New Developments in Meter Proving

☐ These new developments are bringing uncanny accuracy possibilities to all meter installations. By attaching an electronic tachometer to the shaft from a meter, the meter reading can be taken in increments as small as 1/1000 of a gallon. This greatly reduces the volume requirements of the prover section. By starting and stopping the electronic counter with a piston or sphere running through the calibrated volume loop of pipe, the meter factor can be calibrated closely with a small volume.

By D. A. Van Scoy . . . . . Page 53

Great Lakes Overhauls 134 Floating-Roof Tanks

☐ Company employes replaced shoes and seals, converting ladders to self-leveling stairways and replacing the roof hangers with built-in adjustable pipe supports. Cost of the program about $750,000.

By J. E. Hughes . . . . . Page 57

How the U.S. and U.S.S.R. Gas Industries Compare

☐ Here is a report on a tour of Russian gas installations. As a whole, the Soviet gas industry is decades behind the United States, and thus far, they have come up with few innovations. But Russia is a land of paradoxes, and there are many interesting features in its gas industry.

Interview with Baxter Goodrich by Donald M. Taylor . . . . Page 59

REGULAR MONTHLY DEPARTMENTS

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Distribution Contractors Association Will Fill a Real Need

ONE CHARACTERISTIC that typifies pipe line contractors is their ability to assemble the equipment to get a job done. This is true in organization as well as in the field. Last month those contractors who build most of the lower pressure, and sometimes smaller diameter, pipe lines in the United States joined together to form the Distribution Contractors Association.

In many ways the operations and purposes of this new association will be patterned after the very successful work of the Pipe Line Contractors Association. Because of the special nature of problems faced by the "small line" contractor in the growing demands for his services, leaders in this important pipe line group decided to organize a separate association. Support for the new contractor association is strong; at the organizational meeting in Kansas City, Mo. the 30 leading contractors present were polled on accepting membership. Twenty-six accepted membership and only four reserved their decision until a later date. There were no contractors present who rejected the association's plans or purposes.

The purposes of the association are defined in the bylaws:

- "To serve as a medium of exchange of information among contractors engaged in the construction of distribution pipe lines throughout the United States.

- "To make membership in the Association a reasonable assurance to the public of the skill, integrity and responsibility of its members.

- "To maintain the standards of the distribution pipe line construction business at the level necessitated by its quasi-professional character and to establish members of the Association in the public mind as contractors who fulfill obligations in good faith.

- "To promote more cordial and cooperative relations among individuals and firms engaged in the construction of distribution pipe lines.

- "To encourage efficiency among distribution contractors and their employes.

- "To seek correction of injurious, discriminatory and unfair business methods practiced by or against distribution contractors.

- "To eliminate as far as possible the occurrence of injury and death to employes of distribution construction firms."

These purposes parallel closely those of the PLCA and, pursued with the same dedication of the main line association, they should bring a great deal of benefit to the distribution contractor.

Reports from both the PLCA and DCA indicate that there will be a good working relationship between them. While activities will be completely separated, they will be supplementary. Among charter members of the DCA there are five regular members of the PLCA. And there may well be more contractors who will find a need for membership in both groups.

Emerson H. Clark, Engineering-Construction Co., Tulsa, was elected first president of the DCA in Kansas City. Other officers nominated and elected are: W. C. Donaldson, Underground Constructors, Inc., Dodge Center, Minn., first vice president; A. T. Everham, Midwestern Contractors, Inc., Wheaton, second vice president; and Don W. Miller, Don W. Miller, Inc., Green Springs, Ohio, as treasurer. An executive secretary will be appointed to carry out the directives of the DCA board. Directors named at the organizational meeting are: Deane Baker, Somerville Construction Co., Robert Burkhardt, Burkhardt Pipeline Construction Co., F. E. Everett, Mid-Mountain Contractors, Inc., M. L. Hulcher, M. L. Hulcher Co., Inc., B. M. Laulhere, Hood Corp., W. F. Muncie, Universal Pipeline Constructors, Inc., R. E. Reutzel, R. E. Reutzel Co., Inc., and I. C. Russell, Russell Construction Co.

At the charter meeting the DCA organized a labor negotiating committee and a membership committee. Plans call for the first annual convention of the Association in Kansas City in February 1962.

The Distribution Contractors Association has set important goals and is organizing well from the start. PIPE LINE INDUSTRY wishes it and its members the best of success in carrying out these purposes.

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HARVEY W. JONES, JONES CONSTRUCTION CO., NATCHEZ, MISS.

This is one of two Cat D7 Series D Tractors used by the Jones Construction Co. for site preparation and general construction work. Commenting on their ability to move cheap dirt, Mr. Jones said: "The D7D is the right size tractor for our oil field and other contracting work. It's large enough to do the job—and small enough to be easily transported. We're well pleased with the trouble-free operation the past year. A D7D can't be beat!"

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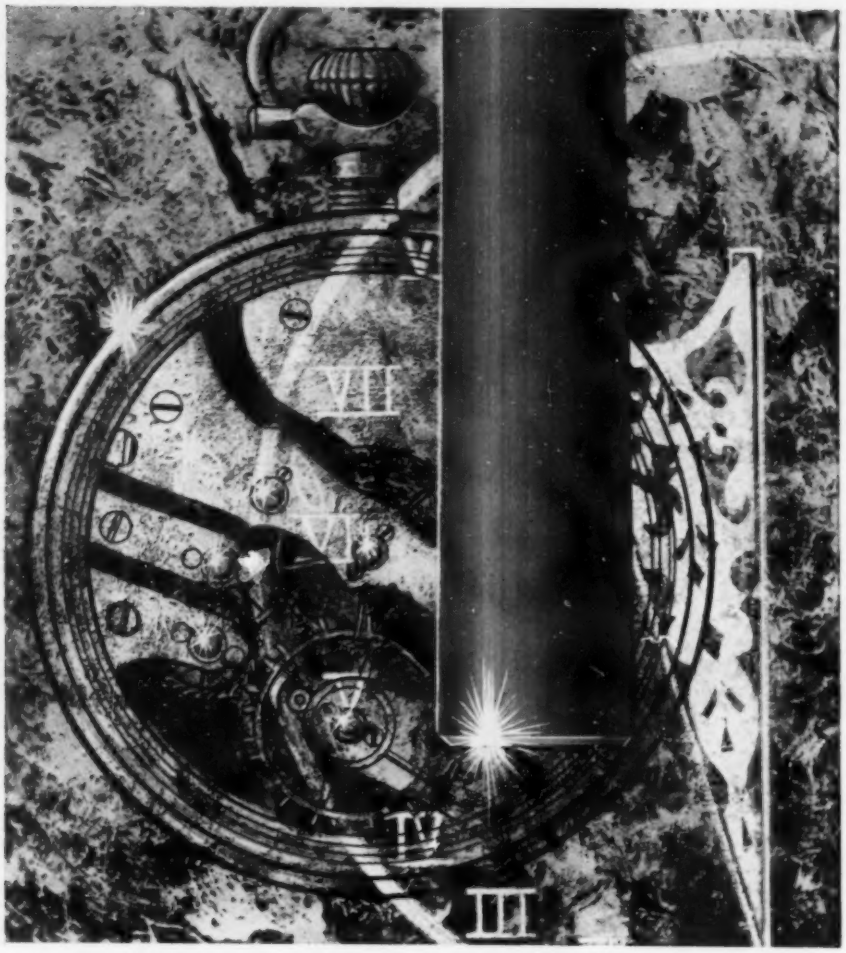
OIL CLUTCH—another exclusive in the D7D class. Users report up to 2000 hours of adjustment-free service on even the most severe applications. Clutch replacement almost unheard of!

For more data on advertised products, use cards, last page.



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PIPE LINE INDUSTRY and The PIPE LINE CATALOG for the oil and gas pipe line industry.

WORLD OIL (formerly the Oil Weekly) and The COMPOSITE CATALOG for the drilling-producing industry.

PETROLEUM REFINER and the REFINERY CATALOG for the Hydrocarbon Processing Industry.

Indexed by Engineering Index
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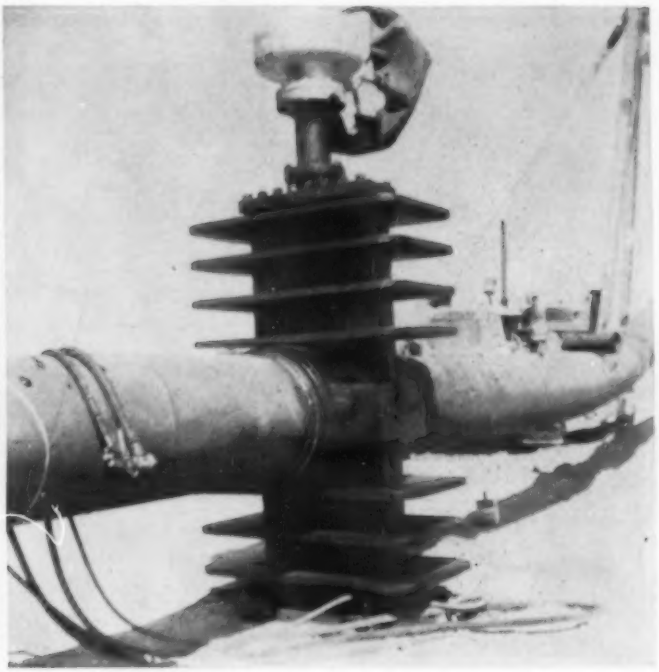
Roskote cold-applied mastic was spray-applied to 30" valves by El Paso Natural's personnel at Grants, New Mexico. Risers and support legs were coated with Roskote and wrapped with Royston Glas-Wrap for additional mechanical abrasion protection.



On the El Paso Natural Gas Company line being laid at Fort Stockton, Texas, by Western Pipeline Company, all 20" valves were spray-coated with Roskote cold-applied mastic.

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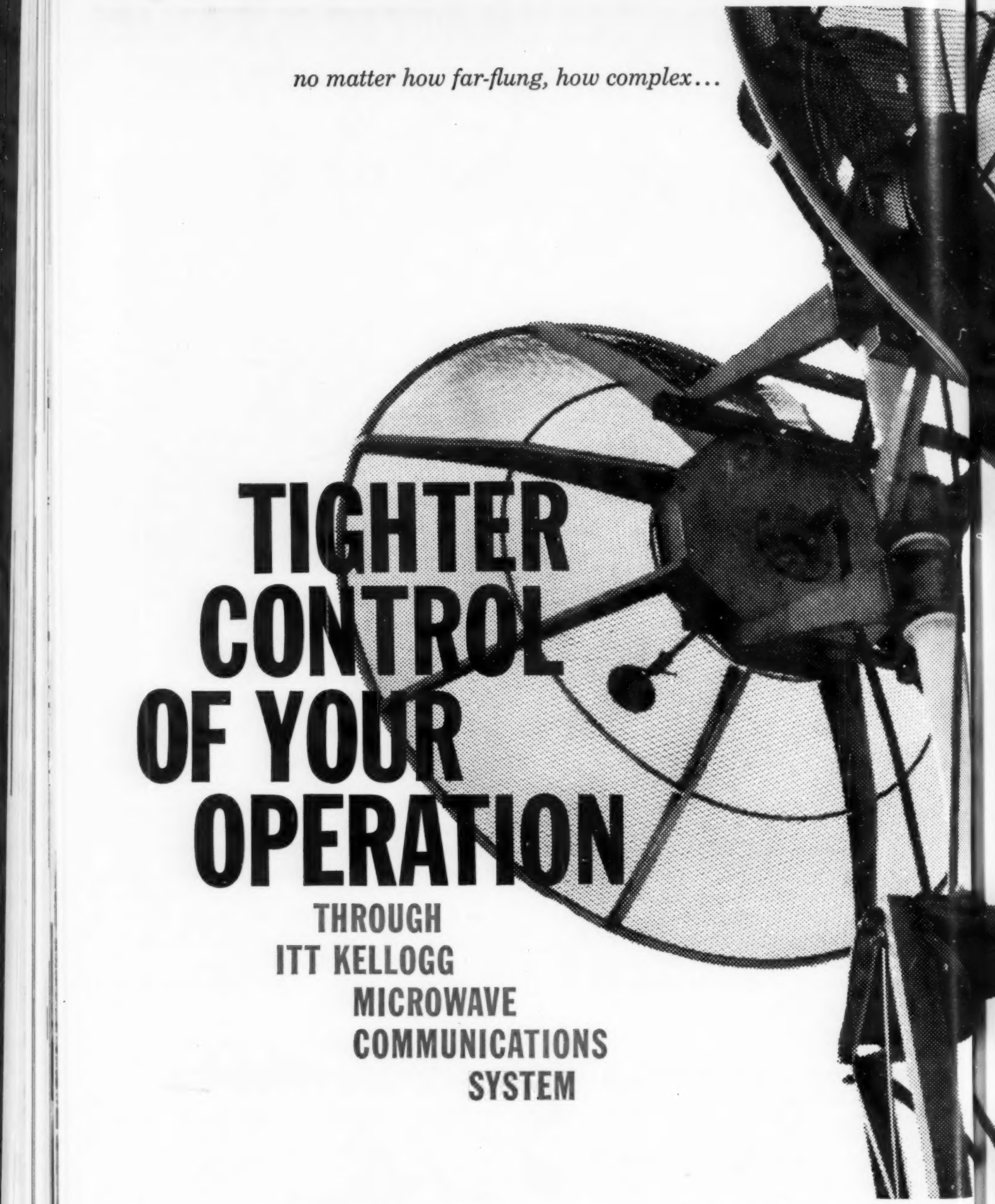

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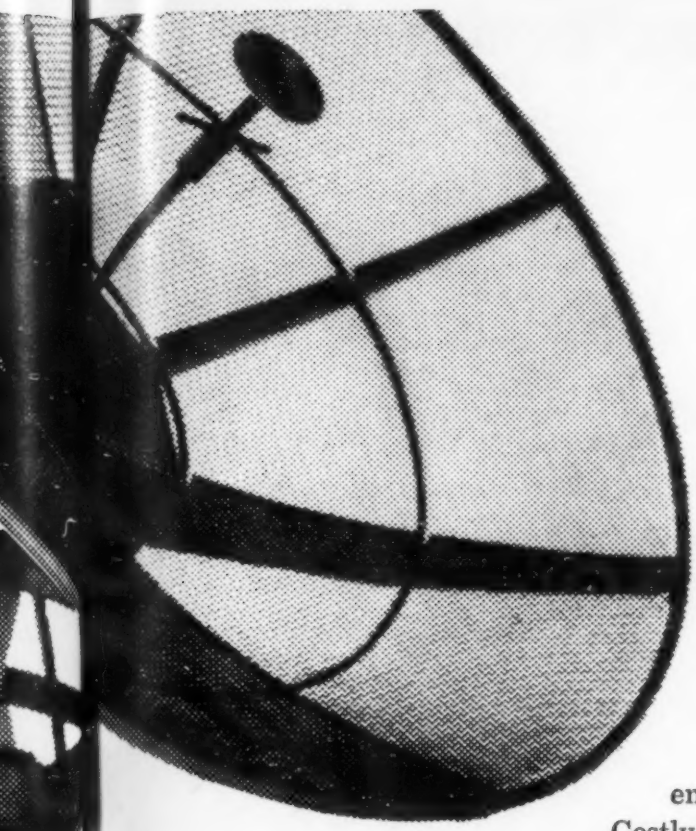

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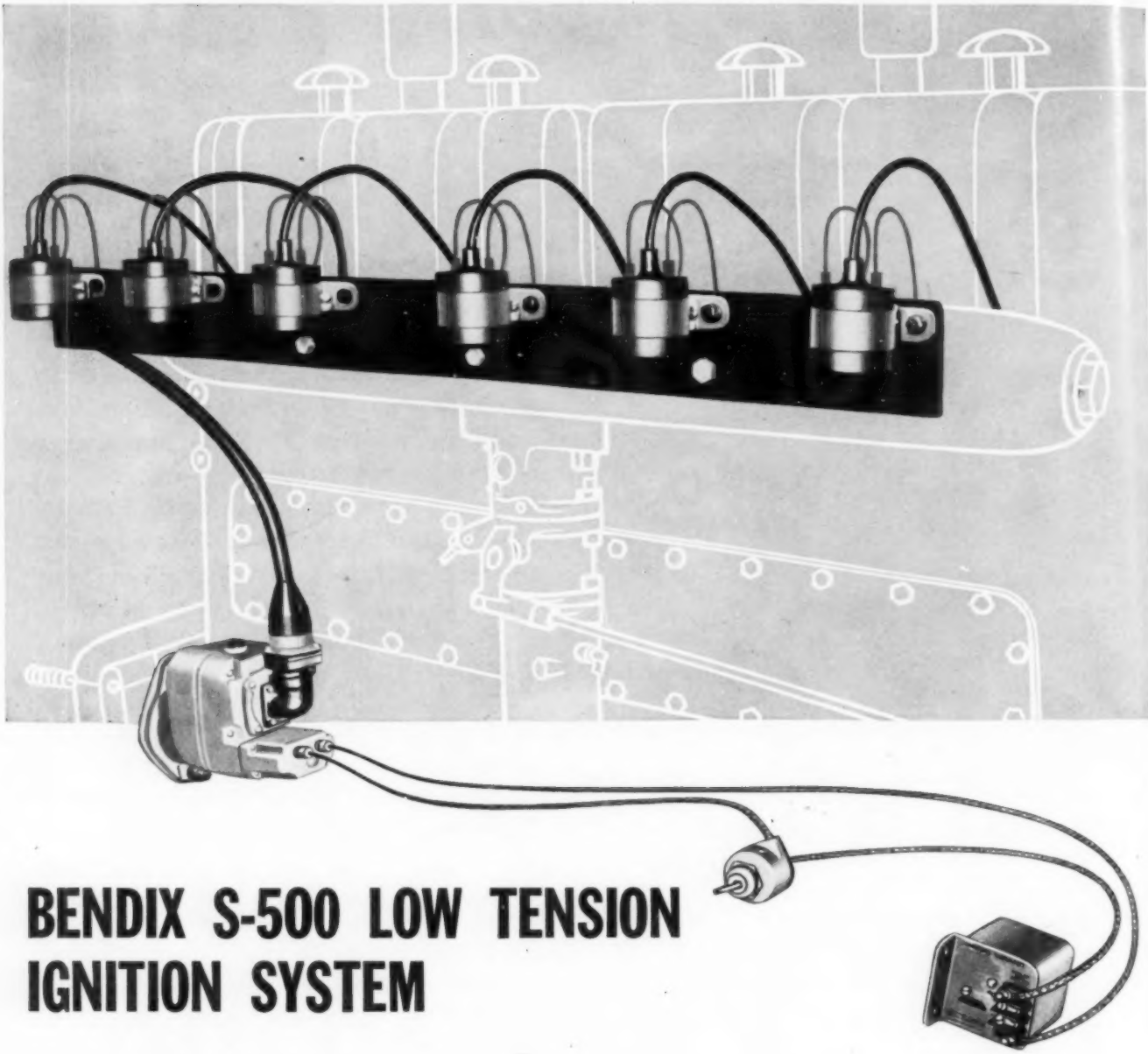

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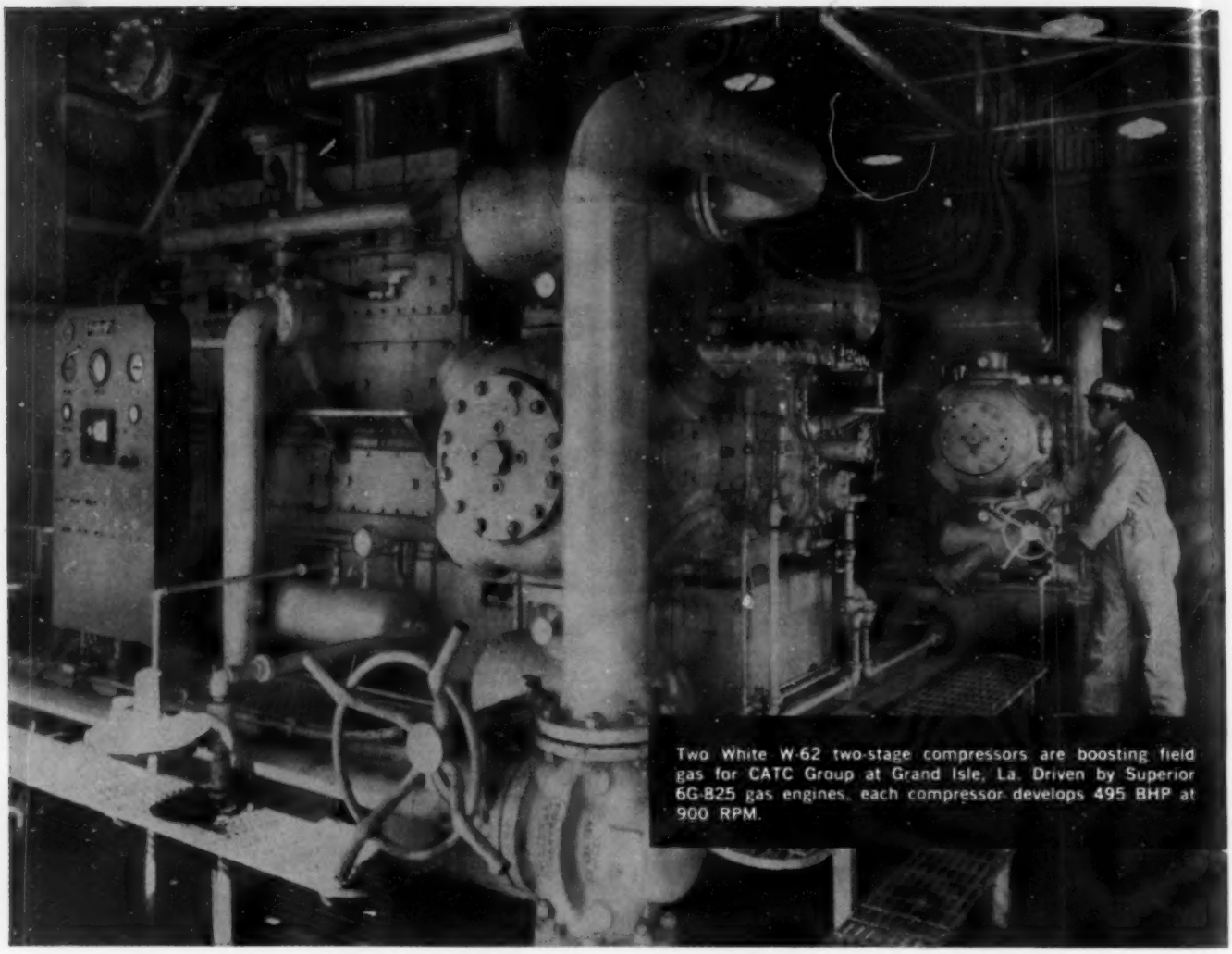

Two White W-62 two-stage compressors are boosting field gas for CATC Group at Grand Isle, La. Driven by Superior 6G-825 gas engines, each compressor develops 495 BHP at 900 RPM.

ONSHORE-OFFSHORE... CATC* Served

By White/Superior Engine-Compressor Sets

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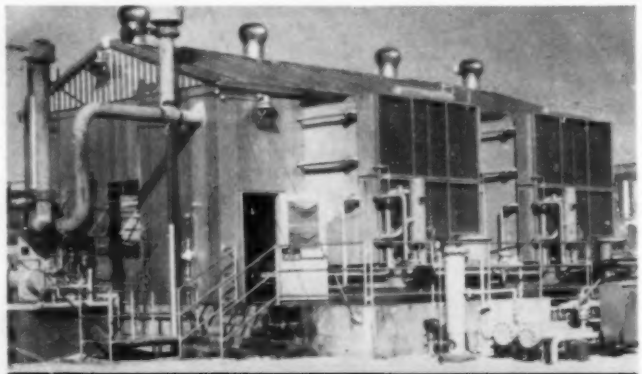
ENGINES / COMPRESSORS



Engine exhaust gas is used for regeneration purposes on glycol dehydration unit.

For more data on advertised products, use cards, last page.

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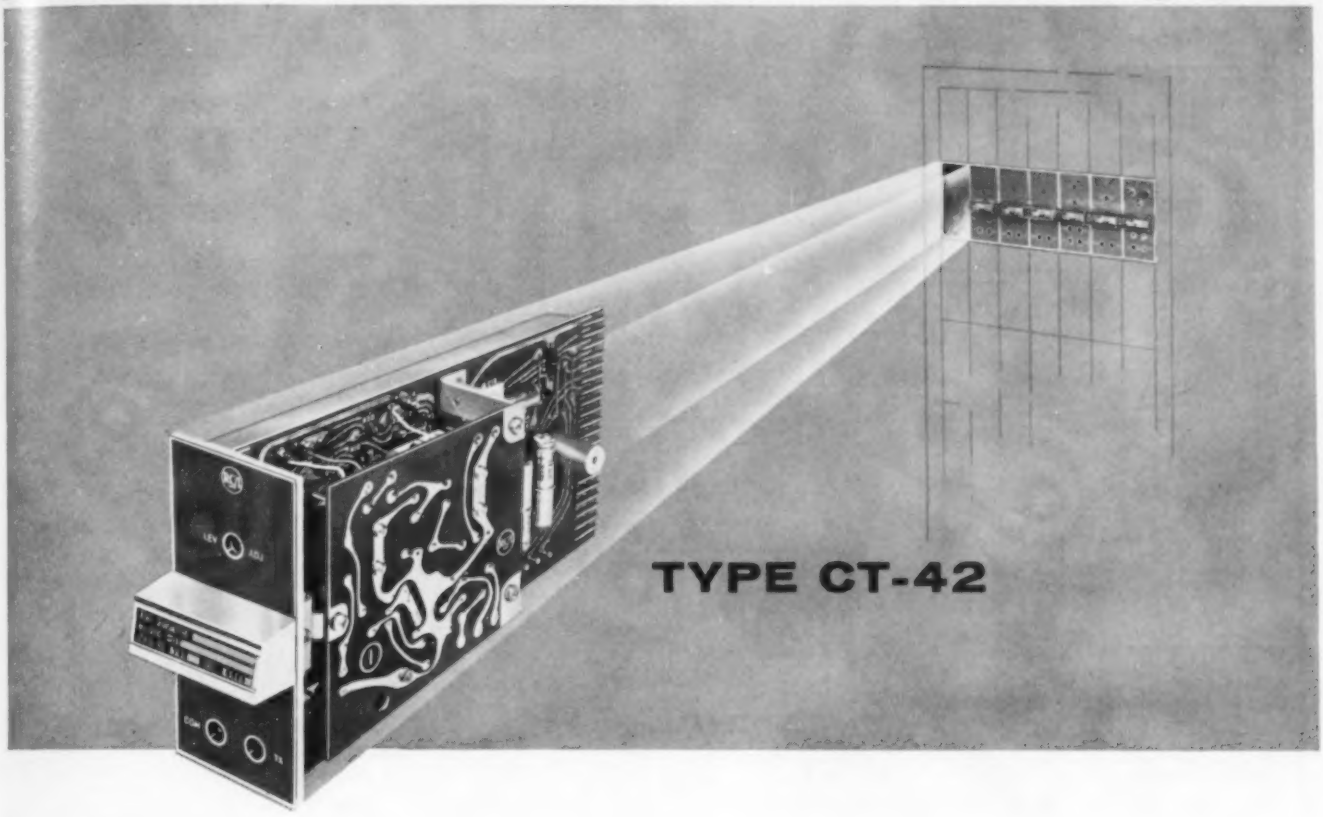

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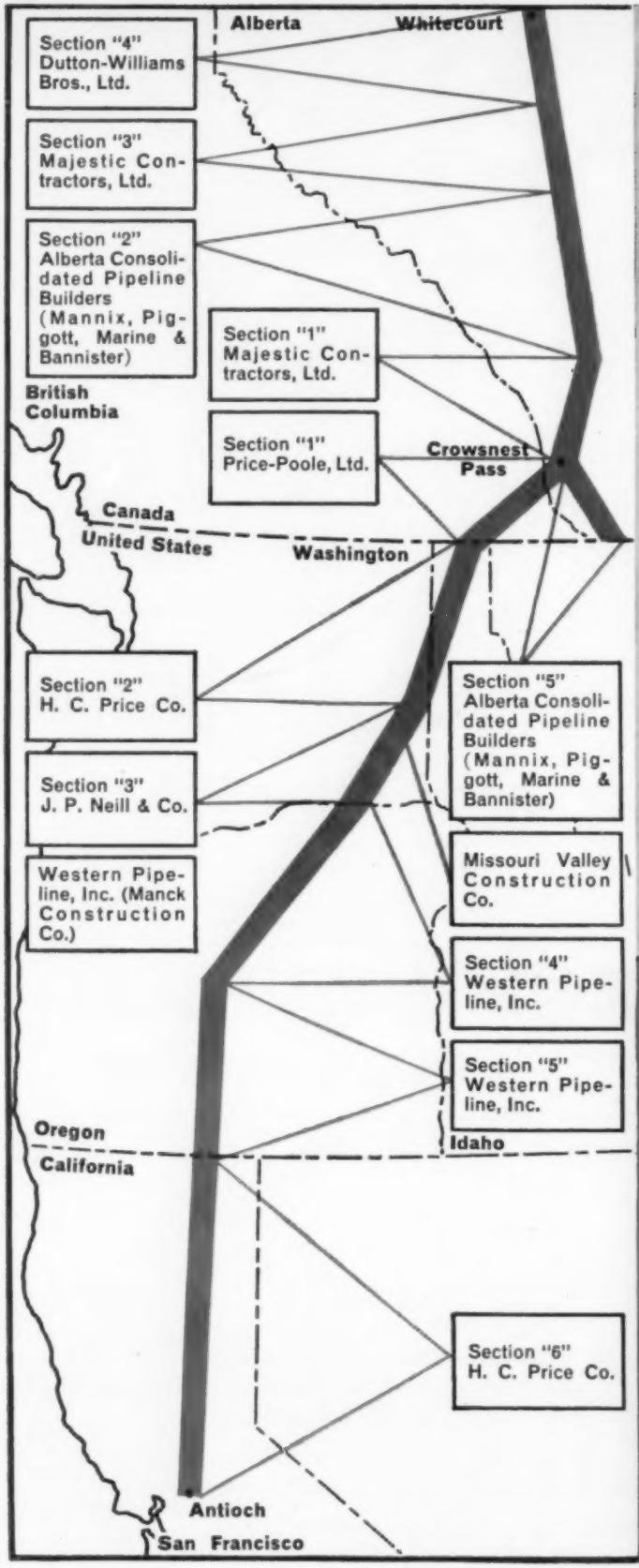

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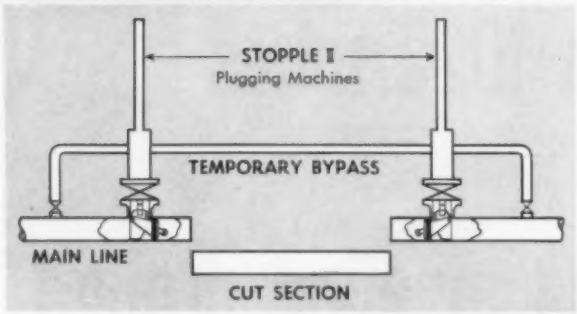
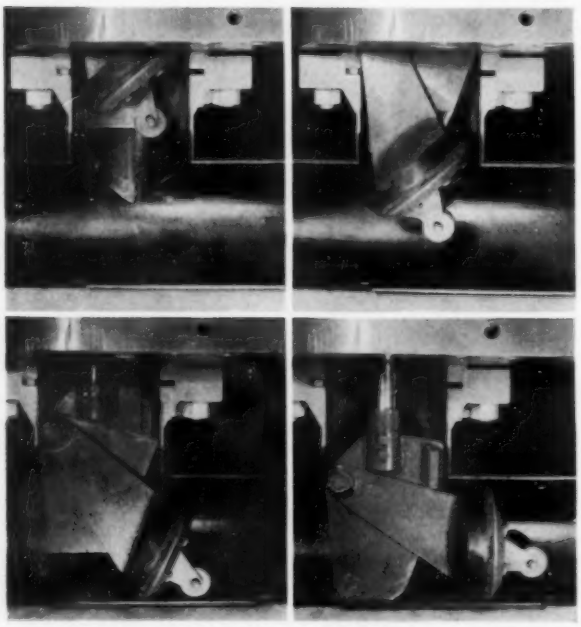
International Offices: Buenos Aires, Argentina; Artarmon, N.S.W. Australia; Brussels, Belgium; Rio de Janeiro, Brazil; Santiago, Chile; Barranquilla, Colombia; Lima, Peru; Ndola, N. Rhodesia; Salisbury, S. Rhodesia; Johannesburg, Transvaal.

For more data on advertised products, use cards, last page.



❶ "This method of plugging a line and bypassing the flow has been used extensively in plant and field operations with WMSon tapping and STOPPLE equipment. Many costly shutdowns have been avoided. Now, WMSon engineers have re-designed and improved the STOPPLE Plugging Machine. Result . . . the all new STOPPLE II . . . offering hydraulic operation, improved, simplified construction, and economy—**real** economy!"



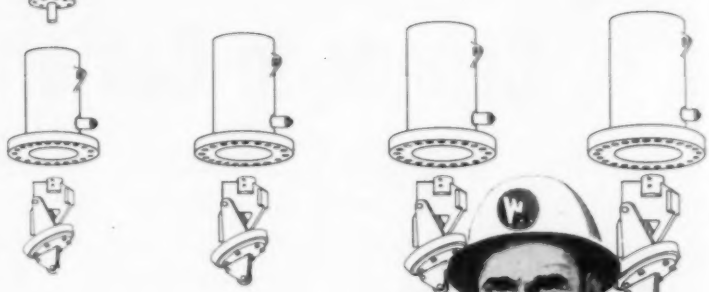
❸ "Here's how STOPPLE II works. After the tap is made, the STOPPLE II is mounted on a WMSon SANDWICH Tapping Valve, and the plugging head is lowered into the line, stopping the flow completely. New single link construction of the plugging head offers built-in simplicity . . . and strength for high pressure plugging."

NEWS FROM DOWN THE LINE!

NEW economy
NEW improved design
NEW interchangeable plugging heads . . .

WMSON'S ALL NEW STOPPLE II®

Plugging Machine for piping modification or repair WITHOUT SHUTDOWN!



❷ "Here's the major reason for this economy. The STOPPLE II has a hydraulic cylinder that is interchangeable with plugging heads of different sizes. For example, one hydraulic cylinder can be used on a 14", 16", 18" or 20" line by using it in combination with a plugging head and housing of the proper size."

•

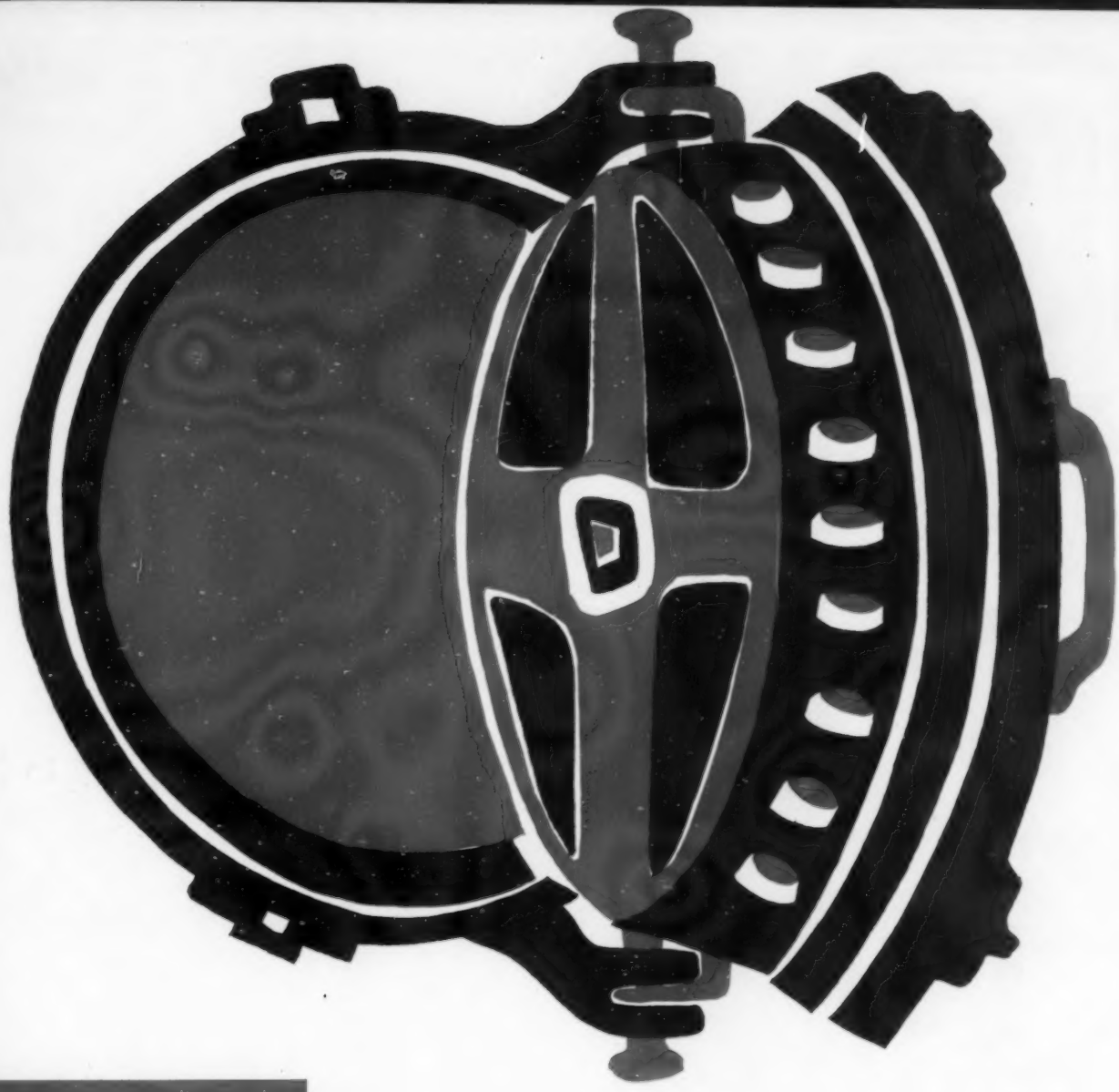
WMSon STOPPLE II with hydraulic operation is available in sizes 8"–30". The 4" and 6" units are hand operated. Single link is standard in all sizes. Write for additional information and specifications: Write Dept. E for Bulletin A-513.

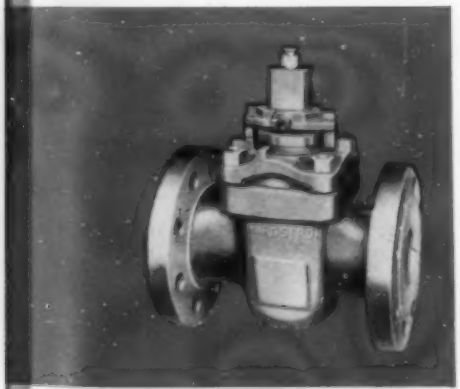
U.S. AND FOREIGN PATENTS AND PATENTS PENDING

T.D. Williamson, Inc.

P. O. BOX 40 • TULSA 2, OKLAHOMA

REPRESENTATIVES AROUND THE WORLD





seals tight: Let's get basic: The prime function of a valve is to shut off a line. And Rockwell-Nordstrom valves do this job better than any other valve on the market. They live longer, too, saving you money every year in valve replacement. The cost? No more than ordinary valves. Write for complete information.

ROCKWELL-Nordstrom VALVES
another fine product by
ROCKWELL

Write to:
Rockwell Manufacturing Company
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Pittsburgh 8, Pa.
Canadian Valve Licensee:
Peacock Brothers, Ltd.
Box 1040, Montreal, Quebec
Rockwell International, S.A.
81 Rue de la Servette
Geneva, Switzerland

Please send me Bulletin V-217.

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Company_____

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City_____ Zone____ State____

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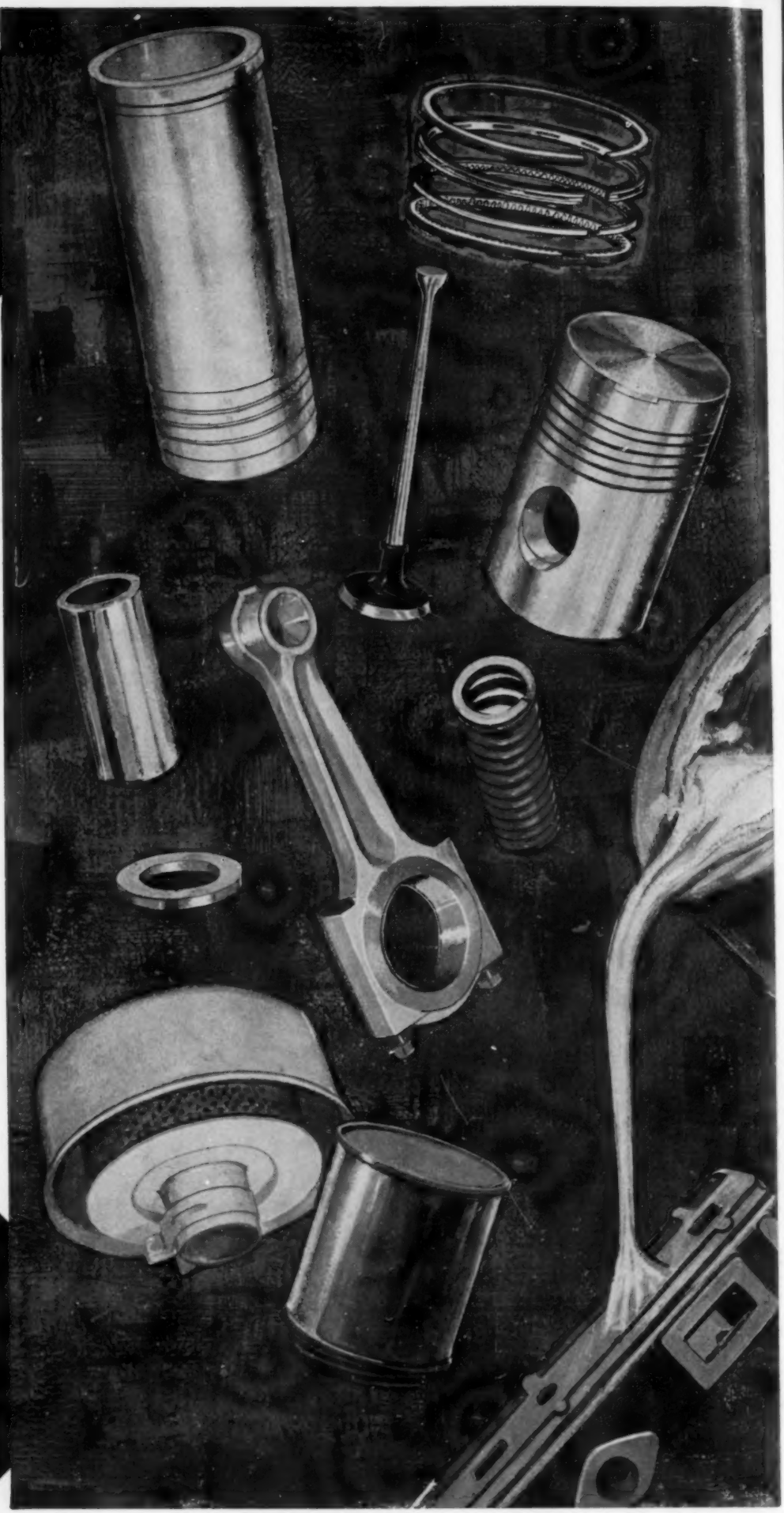


Nation's largest manufacturer of heavy-duty and specialized engine parts—

NEW GOULD-NATIONAL ENGINE PARTS DIVISION

In creating its new Engine Parts Division, Gould-National combined under one corporate roof the brands, products, services and facilities of these wholly-owned subsidiaries:

Wilkening Manufacturing Co., Philadelphia, manufacturers of Pedrick® piston rings and castings.

White Machine Works, Eau Claire, Wisconsin, manufacturers of Superior-Arrowhead cylinder sleeves, sleeve assemblies, pistons, piston pins, Burd piston rings, valves and valve train parts, foreign car engine parts and filters.

Gillett & Eaton, Lake City, Minnesota, piston and casting specialists of cast iron, aluminum alloy, Vanasil® aluminum alloy pistons and specialized engine parts.

Arrow Head Steel Products, Howell, Michigan, manufacturers of aluminum pistons, connecting rods and other castings.

Now, Gould-National, the nation's largest producer of automotive replacement batteries, is also the nation's largest basic manufacturer of heavy-duty and specialized engine parts. The Division is the largest one stop source for the most complete line of engine parts available from one manufacturer. It is the only engine parts manufacturer with both iron and aluminum casting and machining facilities.

By utilizing the efforts of one combined sales force, the customer will benefit from greater sales-service efficiency, more concentrated field coverage.

Product improvement will result from the formation of a special team in the Gould-National Engineering and Research staff. It is the Gould-National way of assuring continuing top quality and improved product performance.

New engineering developments, manufacturing and production techniques from all areas within the Division will benefit all customers, no matter what the product may be.

This is the Gould-National Engine Parts Division—the nation's newest parts manufacturing group with over two centuries of combined experience.

Need heavy-duty engine parts? Automotive engine parts? Foreign car engine parts? Parts for such specialized applications as air and refrigeration compressors? Need complete and modern facilities for aluminum and iron castings? If your specifications call for the best of these, if you need them fast and need them right . . . turn to . . .

Superior-Arrowhead and Burd are trademarks of Gould-National Batteries, Inc.

GN

ENGINE PARTS DIVISION
GOULD-NATIONAL BATTERIES, INC.
St. Paul 1, Minnesota

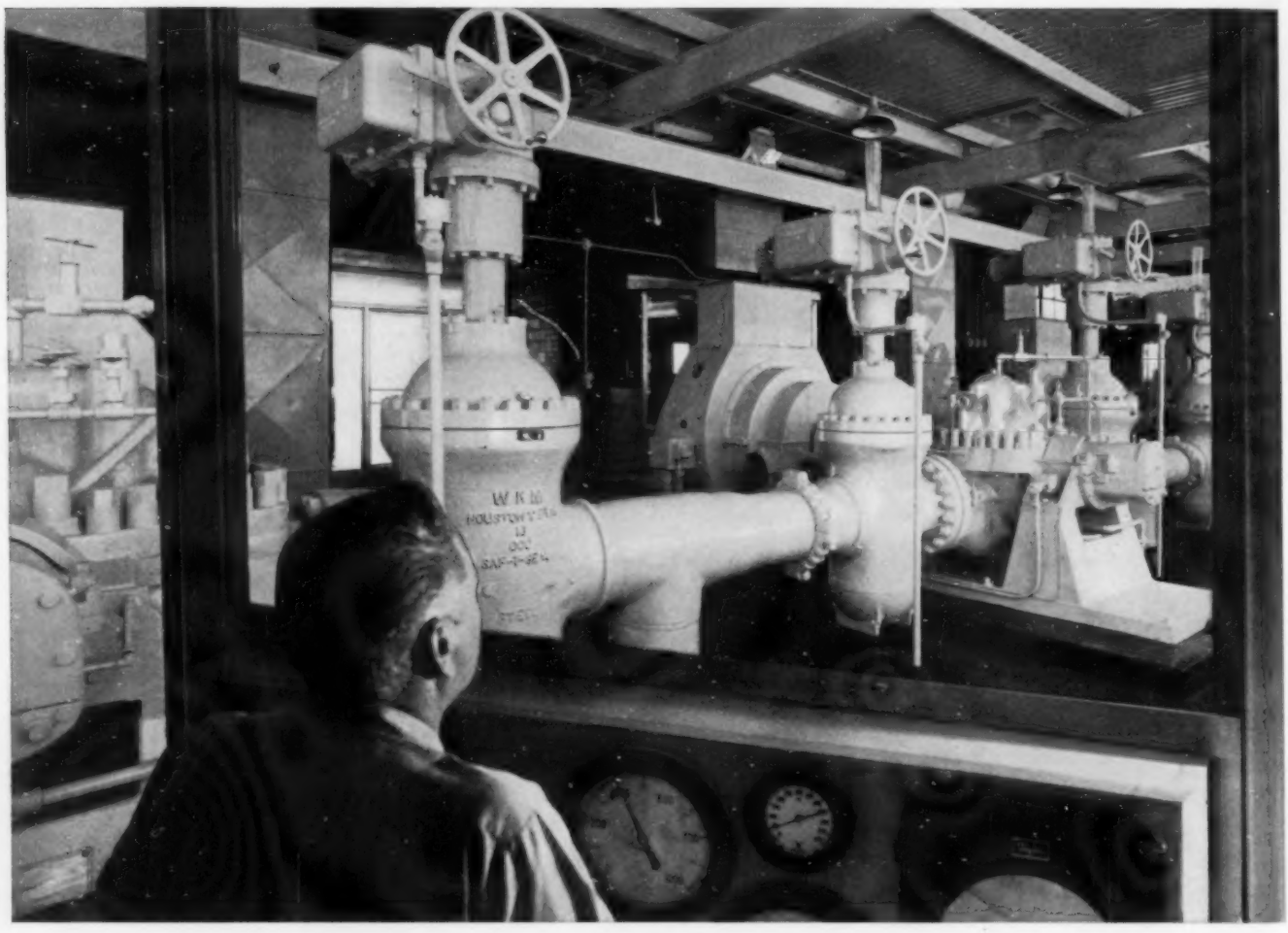
WHEN SO MUCH DEPENDS ON A VALVE...
Specify Saf-T-Seal

Five W-K-M SAF-T-SEAL Gate Valves in this automated crude oil pumping station control a daily flow of 250,000 barrels of crude at 500 psi. These valves are first choice for vital jobs because of their unequalled sealing ability and extremely high reliability factor.

The SAF-T-SEAL is a non-lubricated pressure sealing gate valve—its floating steel seats with Teflon inserts give positive, total contact sealing *both upstream and down, in both open and closed position.* Its basic simplicity provides a degree of reliability greater than any other similar valve. Further, when working parts become worn, new valve performance may be quickly restored by installing new parts *while the valve is on the line.* Other features, such as automatic relief of excessive body pressure, the efficient enclosed packing gland, the effectiveness of the valves in double block and bleed service, are explained in Catalog WS 1061. Write for your copy today. W-K-M Division of ACF Industries, Inc., Box 2117, Houston, Texas.

W-K-M SAF-T-SEAL Gate Valves are available in sizes from 2 inches through 42 inches. Pressure ranges: ASA 150, ASA 300, ASA 600, ASA 900.

WHEN SO MUCH DEPENDS ON A VALVE... *Specify* W-K-M®



W-K-M
DIVISION

ACF INDUSTRIES

When portable electric power is vital, you can't afford to gamble on "accident prone" parts. Only Onan offers so many safeguards against breakdown: Stellite valves, oversize bearings, shorter-stronger connecting rods and crankshafts. Equally important, *only* Onan is Performance Certified to deliver *all* the power promised by its nameplate.

Only Onan is certified to give you all the power promised by its nameplate

It's a fact that many electric plants on the market today do not deliver the output promised by their nameplate rating.

Every Onan plant is given a rugged workout *under full load* before it is shipped—*your assurance* that the Onan you buy is ready for hard work the day you get it.

But this isn't enough. Independent laboratory inspectors pull surprise inspections to double-check our tests and testing methods. They pull a plant off the line, run it, stop it, load it, overload it, check and recheck. Their torture test gives positive proof of Onan's quality. End result: *Onan's exclusive Performance Certification* . . . your assurance of getting every watt of power you pay for.

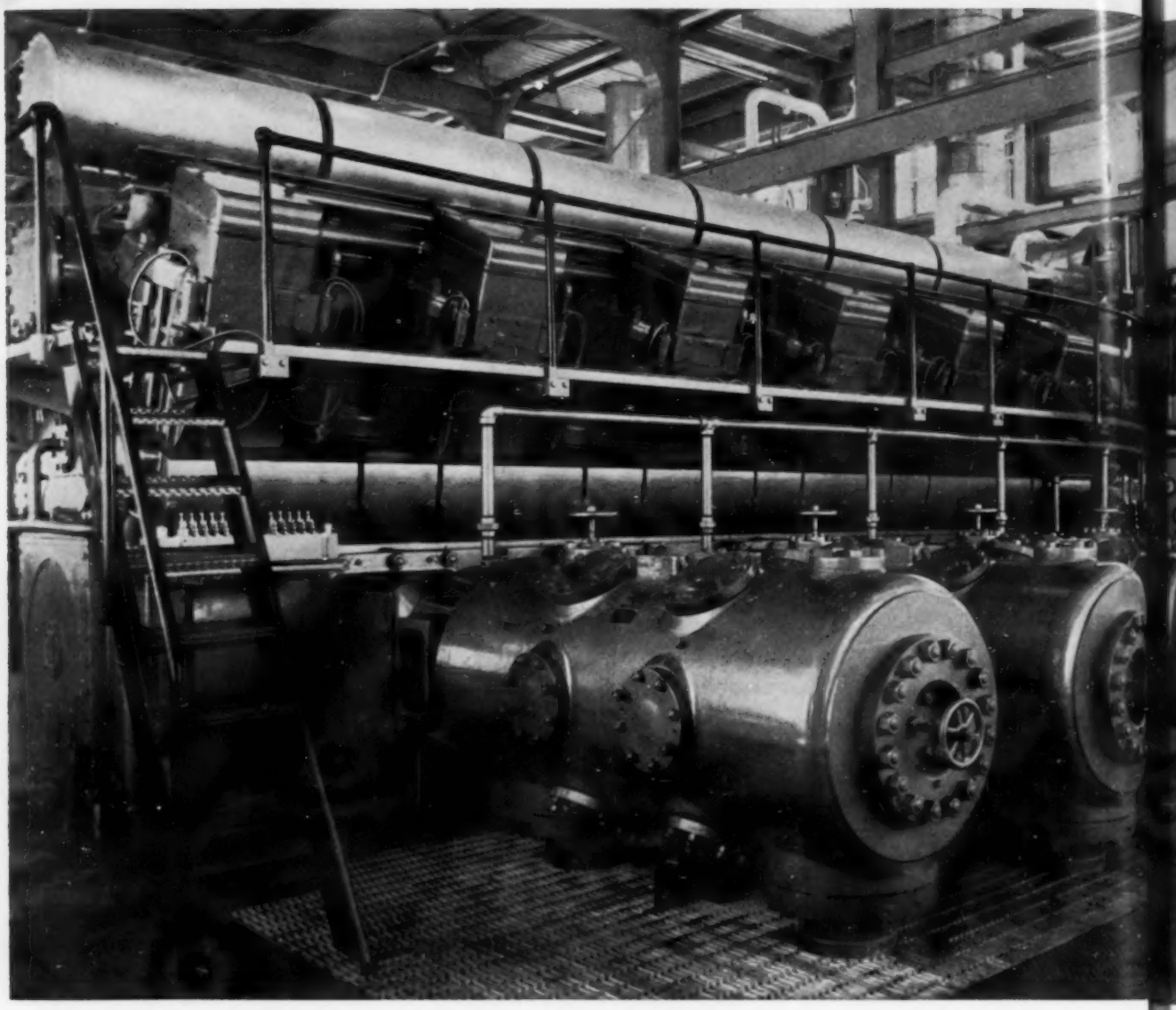
So when you're tempted by an electric plant "bargain," make sure its nameplate rating is not "inflated." Be sure you're getting full measure for your money. Remember, *the electric plant that shortchanges you in power output is no bargain at any price!* Only Onan is Performance Certified to deliver everything the nameplate promises.

See Onan electric plants soon. Compare before you buy. You'll find your Onan distributor listed in the Yellow Pages. Call him or write direct.

PERFORMANCE CERTIFIED
We certify that when properly installed and operated this Onan electric plant will deliver the full power and the voltage and frequency regulation promised by its nameplate and published specifications. This plant has undergone several hours of running-in and testing under realistic load conditions, in accordance with procedures certified by an independent testing laboratory.
Onan
Onan
World's Leading Builder of Electric Power Plants

Onan

ONAN Division, Studebaker-Packard Corporation, 2701 University Ave. S. E., Minneapolis 14, Minn.



ENGINE EFFICIENC

KVT

GAS-ENGINE COMPRESSORS

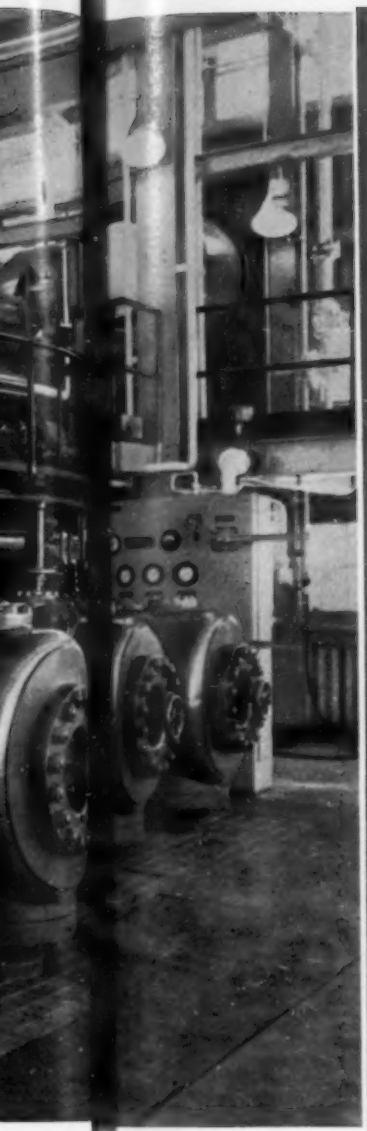
setting a new record in fuel economy for gas-engine compressors...

6300 btu/bhp/hr!

From Ingersoll-Rand's modern compressor plant Painted Post, N.Y., comes a completely-new line heavy-duty gas-engine compressors and power units the 2000-4500-hp class. These powerful 4-cycle V-ang units offer a new high in fuel economy and unmatch flexibility for big-engine jobs on pipelines and in pr cess plants.

The KVT, a completely new design, offers the low fuel consumption ever available in an engine-compre sor. Using a high-level constant-pressure turbochargi system, it will run continuously at full speed and lo with a fuel input of only 6300 btu/bhp/hr!

Also available is the new KVH, similar in size an construction but using a pulse system of low-level tu bocharging which results in greater horsepower at fuel rate of 6900 btu/bhp/hr.



THE WORLD'S MOST EFFICIENT GAS-ENGINE COMPRESSOR...

The first of the new KVT line, this 3000-hp unit with 5 compressor cylinders and 12 power cylinders has been in successful operation in a Louisiana gas pipeline station since December, 1959. More units are now installed on major pipelines in other parts of the U.S.

...FROM THE WORLD'S LARGEST COMPRESSOR FACTORY

Painted Post, N.Y.— the world's largest facility for the manufacture of compressors and engines, newly-expanded with the most modern equipment and skilled personnel.

the large economy size!

At the compressor end, the KVT and KVH offer additional advantages: (1) new pipeline cylinder design with bottom intake and discharge connections permits simpler, neater, sturdier installations; (2) cylinders may be placed on both sides of the frame for greater flexibility on process jobs; (3) I-R Channel Valves are unmatched for efficiency and long life.

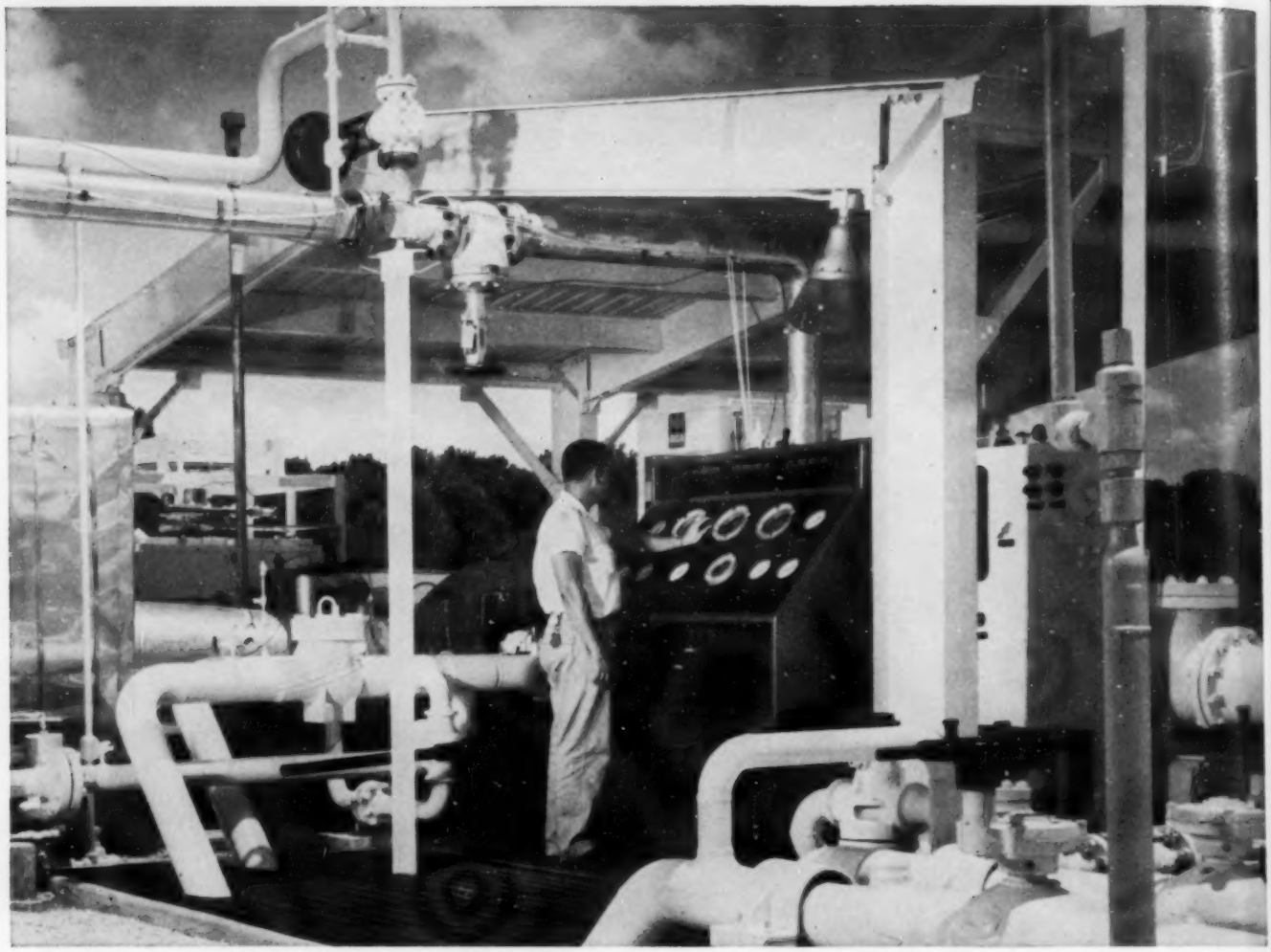
PKVT and PKVH gas engines, in corresponding sizes, offer efficiency and economy for all prime mover jobs. Where both engines and engine-compressors are used, they give the added advantage of standardized engine and running-gear components for lower inventories and quicker service.

Whether your needs are best met by the unmatched fuel economy of the KVT or the higher power of the KVH, you will find in these revolutionary new units the same service-proved dependability which has characterized Ingersoll-Rand 4-cycle, V-angle engine-compressors from 120 to 2000 hp for years. Your I-R representative is ready to give you more information.

Ingersoll-Rand

237A6 11 Broadway, New York 4, N.Y.

The World's Most Comprehensive Compressor Experience



Trunkline uses Solar Gas Turbine compressor in pipeline station

Currently "on-line" at Trunkline Gas Company's Cypress, Texas, pipeline compressor station is an 1100 hp Solar *Saturn* gas turbine-driven centrifugal compressor set. In this application, it pumps up to 60 million cu ft of natural gas per day.

At Cypress, Trunkline is helping to pioneer a new concept: the use of a high-speed, turbine-driven centrifugal compressor in the low-volume range. Traditionally, reciprocating equipment has been the most practical in the range from 75 to 1000 inlet cu ft per minute at up to 1500 lbs pressure.

However, the availability of industrial high speed drivers, such as the Solar *Saturn* T-1000 gas turbine engine, has provided the impetus for Solar to design and build a line of efficient, long-life centrifugal compressors for this range.

The Trunkline installation is 1/10th the size of conventional compressor sets, costs an estimated 2/3rds as much to install and will run on a variety of fuels. At Cypress, for instance, the Solar compressor set runs on natural gas from the line. It would also run on gasoline, diesel fuel, kerosene or LPG fuels.

Another advantage of Solar compressor packages is the fact that a complete turbine-driven 1100 hp unit weighs less than 10,000 lbs and occupies under 300 cubic feet of space. It is easily portable.

Solar compressors are also ideal for field boosting. One *Saturn* turbine-powered set will deliver as high as 100 million cu ft per day. A unique modular concept of interchangeable compressor staging allows quick, easy field changes to accommodate changing pressure and flow requirements.

Solar's industrial turbomachinery is designed for rugged use. Solar turbines start instantly without warm up and are ideal for remote or unattended operation. Ranging from 50 to 1100 hp, they can deliver more power per pound than conventional engines for pumping, electric power generation, oil well servicing and other prime mover requirements.

For more information about Solar turbomachinery, write Dept. J-143, Solar Aircraft Company, San Diego 12, California.

SOLAR

A subsidiary of International Harvester Company

It's not the initial cost...

It's the upkeep!

... it can be the same in pipeline protection!

Don't let the initial "savings" of "bargain" pipeline protection fool you! You write your own ticket on future maintenance costs the day you coat and lay your pipeline. With economy coatings, it isn't long before the few dollars saved on initial cost are eaten-up with excessive cathodic protection and maintenance.

Pitt Chem Coal-Tar Pipeline Enamels and Primers assure *true* long-term protection with a *minimum* of maintenance. This check list tells why!

- ☑ Pitt Chem Enamels—30 years of proven "field" performance.
- ☑ Pitt Chem Enamels—excellent bond assurance.
- ☑ Pitt Chem Enamels—resistance to micro-biological attack.
- ☑ Pitt Chem Enamels—heavy film protection.
- ☑ Pitt Chem Enamels—acid, alkali and petroleum resistance.
- ☑ Pitt Chem Enamels—high dielectric strength.
- ☑ Pitt Chem Enamels—greater immersion resistance.

For your next pipeline construction project, contact Pittsburgh Chemical and learn how you can be *money* ahead with Pitt Chem Pipeline Protection. 3088

PROTECTIVE COATINGS DIVISION

PITTSBURGH CHEMICAL CO.

GRANT BUILDING PITTSBURGH 19, PA.

A Subsidiary of PITTSBURGH COKE & CHEMICAL CO.

TAPECOAT® PROTECTION.

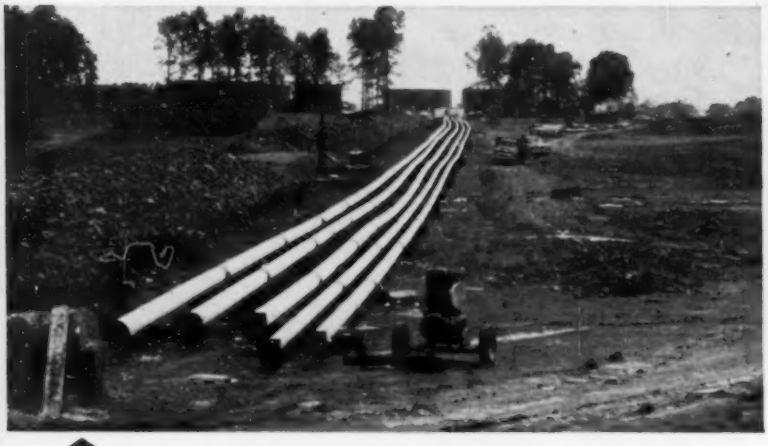
Works for You Anywhere!

NATURAL GAS lines at compressor and meter stations give years of maintenance-free service when protected by TAPECOAT, the coal tar coating in handy tape form.

GAS DISTRIBUTION lines of large diameter can readily be protected with TAPECOAT to withstand the abrasive and corrosive climate in underground service.

CABLE AND CABLE SPLICES in communications service are effectively and economically protected by TAPECOAT.

Lines in **OFF-SHORE DRILLING** operations need joint protection equivalent to the mill-wrapping on the pipe. TAPECOAT is most economical because it gives lasting protection in underwater service.



AIRPORT FUEL LINES need the quality joint protection assured by TAPECOAT. It is easy to apply by spiral or "cigarette" wrapping depending on the size of the pipe. No training needed.

STEEL MILL water lines in this new plant are joint-protected with TAPECOAT. TAPECOAT can be used to advantage to protect any steel surface in underground service, as proved since 1941.

UNDERGROUND GAS STORAGE facilities can be "buried and forgotten" when protected by TAPECOAT. Note protection of tanks, pipe and pipe joints.

Lines buried in cinders in **RAILROAD YARDS** need the sure protection provided by TAPECOAT. There's a size for every purpose from 2" to 24" in width.

Write for full details today

The TAPECOAT *Company*

Originators of Coal Tar Coating in Tape Form

1537 Lyons Street, Evanston, Ill.

Manufactured and Distributed in Canada by
The Tapecoat Company of Canada, Ltd.,
25 Haas Road, Rexdale, Ontario.

Now it's much easier to solve your pipe motion problems

. . . with new Flexonics EXPANSION JOINT *ENGINEERING GUIDE*

New convenient way to solve pipe motion problems! Flexonics Expansion Joint Engineering Guide – just off the press – contains a wealth of vital information in easy-to-read, easy-to-use form. 42 pages of calculations, tables, anchoring and guiding data. Every piping system designer needs this new book. Mail the coupon for your FREE copy!

EJ-275

Flexonics

DIVISION OF CALUMET & HECLA, INC.
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FLEXIBLE METAL and SYNTHETIC HOSE EXPANSION JOINTS
BELLOWS • SPECIAL TUBULAR ASSEMBLIES

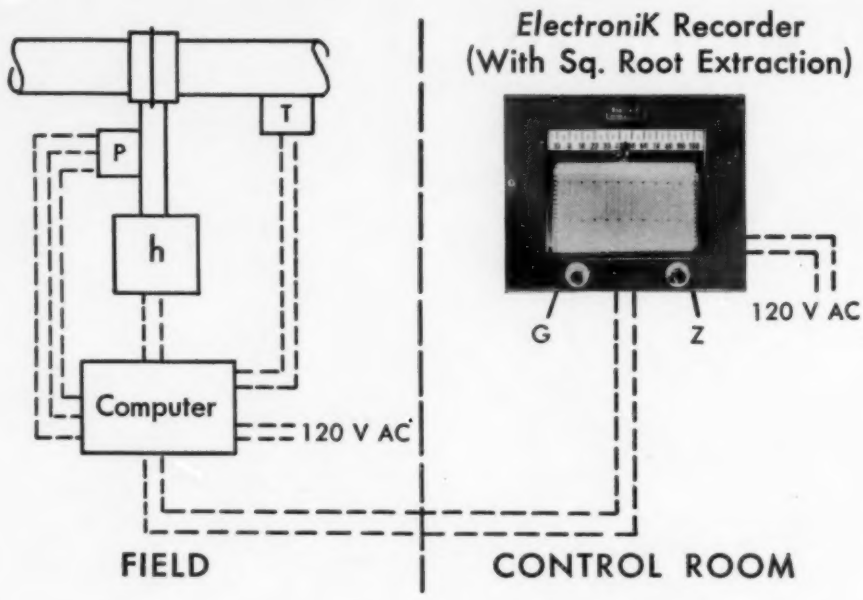
In CANADA
FLEXONICS CORPORATION OF CANADA, LTD.
BRAMPTON, ONTARIO

ATTACH TO YOUR LETTERHEAD—MAIL TODAY!

Flexonics
380 E. Devon Avenue
Bartlett, Illinois

Please send my free copy of the new Flexonics Engineering Guide on Expansion Joints, Expansion Compensators, and Pipe Guides and Supports.

For more data on advertised products, use cards, last page.



New Honeywell all-electric Gas Flow Computer

measures and records mass flow rate automatically and continuously

Here's how the Honeywell gas flow computer solves a gas flow equation:

$$Q = K\sqrt{\frac{hP}{TGZ}},$$

Where **Q** = mass rate of flow, scfh
h = differential pressure, inches of water
P = static pressure, psia
T = flowing temperature, °R, (°F + 460)
G = specific gravity
Z = super-compressibility
K = orifice flow constant

The *ElectriK Tel-O-Set* △P/I transmitter measures *h*; an absolute pressure transducer measures *P*; and a resistance thermometer bulb measures *T*. The analog computer multiplies *h* by *P* and divides by *T* . . . and sends a resultant millivoltage to the *ElectroniK* recorder. The recorder applies the correction factors G and Z, extracts the square root, and records the resultant mass flow Q.

Easily linked to telemetering and remote control systems, supervisory control, data handling and industrial process computers.

No more tedious, time-consuming calculation of gas flow. This versatile gas flow computer does it for you . . . automatically, continuously. It measures and records gas flow in terms of standard cubic feet per unit time, and is the only all-electric system of its kind.

The Honeywell gas flow computer consists of an *ElectroniK* strip chart or circular chart recorder, a power supply, a standard resistance thermometer, an absolute pressure transducer, a voltage-divider type computing circuit, and an *ElectriK Tel-O-Set* differential pressure-to-current transmitter. The transmitters, transducers and computing circuitry can be mounted *near the orifice*, and only two wires bring the signal into the recorder in the control house. Field-mounted equipment available in explosion-proof housings.

There are many optional accessories. The recorder can be supplied with pneumatic or electric control, retransmitting slidewires, digital encoder, motor or servo-driven control index or pneumatic *Indexet*, hi-lo alarms, auxiliary contacts, pulse telemeter transmitter, and many other options.

Get complete details from your nearby Honeywell field engineer. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

First in Control

SINCE 1885

For more data on advertised products, use cards, last page.

PIPE LINE SERVICE CORPORATION

X-TRU-COAT

PAT. NOS. 2,447,420—2,467,642
PRODUCED UNDER THE DEKORON PROCESS

WE'VE COATED 6,000,000 FEET OF PIPE WITH X-TRU-COAT

Our experience and know-how are at your service!

When you require X-TRU-COAT pipe, call on us for immediate, unlimited production in sizes ½" through 4½" O.D. We're applying X-TRU-COAT at our Sparrows Point, Maryland, and Youngstown, Ohio plants, and shortly will be in production at our Franklin Park, Illinois plant.

Of independent producers, only PLS offers you the experience of X-TRU-COAT application since December, 1960. PLS handles pipe from any source, and schedules it to meet your delivery requirements. Specify Pipe Line Service on all of your X-TRU-COAT orders.

For prices and complete information about this service, call or write Pipe Line Service Corporation, Franklin Park, Illinois, or the nearest Sales Office:

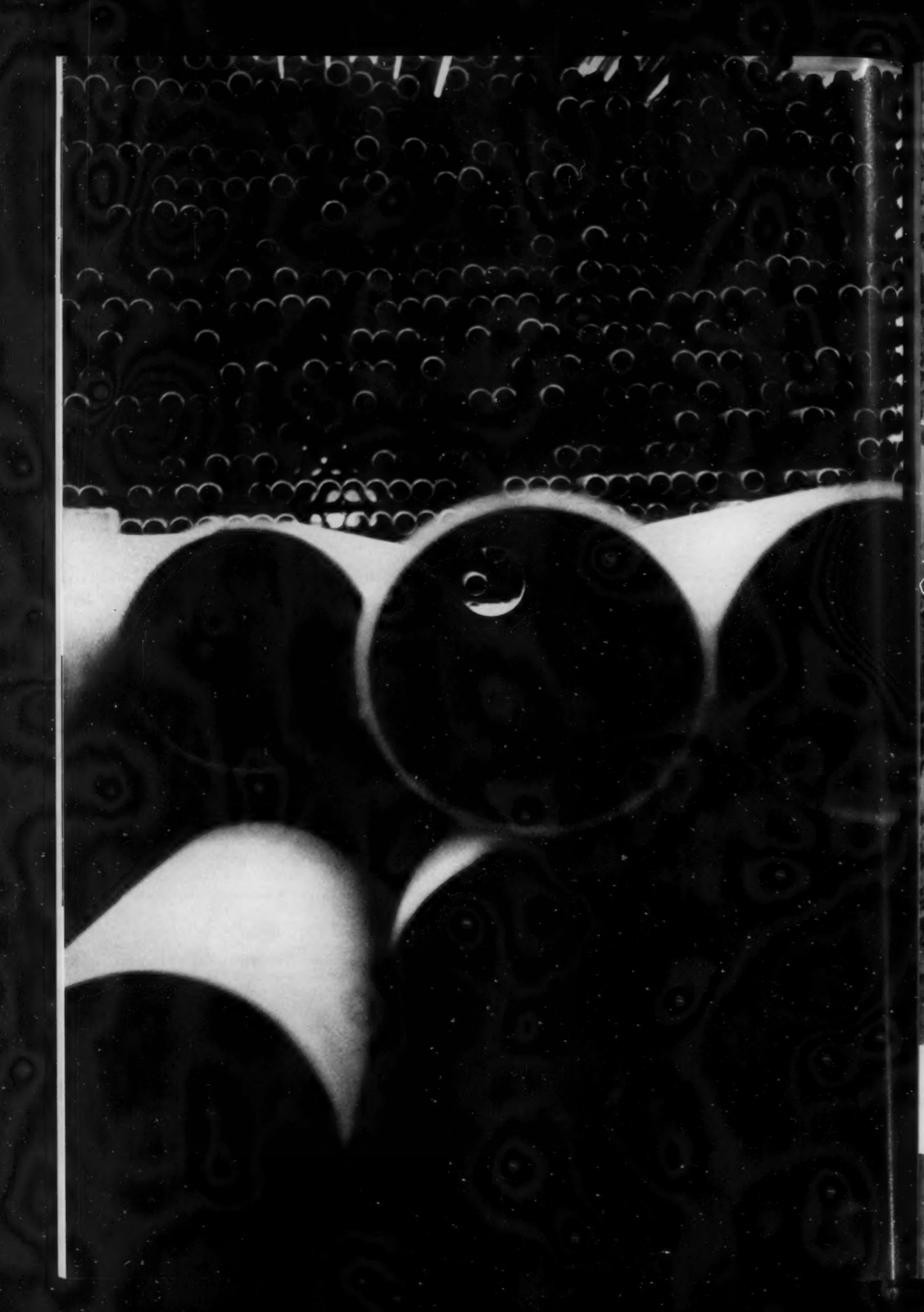
Atlanta, Ga.; Harvey, La.; Sparrows Point, Md.; Omaha, Nebr.; Monmouth Junction, N.J.; Syracuse, N.Y.; North Lima, Youngstown, Ohio; Glenwillard, Penn.; and Corpus Christi, Dallas, Houston, and Longview, Texas.

Pipe Line Service Corporation

A SUBSIDIARY OF AMERICAN STEEL FOUNDRIES

General Offices and Plant: Franklin Park, Ill.

Thousands of miles of pipe coating protection since 1931



MIX

Get fast delivery of continuous weld, electric weld or seamless line pipe from Youngstown

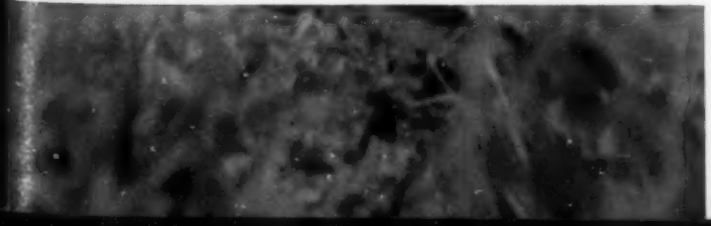
Pipe a town. Lay a transmission line from well head to consuming areas. A gathering line to a processing plant. Loop a system. In all these, and many others, pipe men depend on Youngstown.

Order electric weld pipe from 6⅝" to 22" O.D., continuous weld from ⅛" to 4½" O.D., and seamless from 2⅜" to 14" O.D. Get it with ends plain, beveled, or threaded and coupled. Or corrosion resistant . . . protected by a full range of coatings.

Get greater weldability and bendability in line pipe from Youngstown. Longer lengths. Get pipe that is uniformly round. Every length pressure-tested. Every length is superior quality line pipe because Youngstown, world's second largest pipe producer, controls every single step in manufacture.

Next time insist on the quality, dependability and fast delivery of line pipe from Youngstown. It is available in mixed sizes, quantities and grades direct from mill stocks. Or order Youngstown line pipe as you need it from your local pipe distributor.

Youngstown – growing force in steel



For Youngstown Line Pipe (and mixed shipment) data, write: Dept. 18-D.
The Youngstown Sheet and Tube Company, Youngstown, Ohio.

Special report to users of Caterpillar equipment:

CAT CATERPILLAR

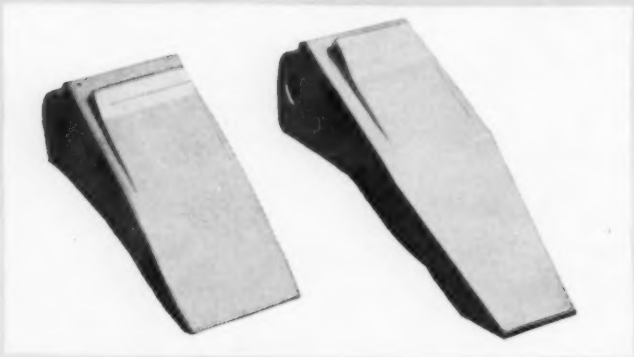
Parts you can trust
...cost less per hour

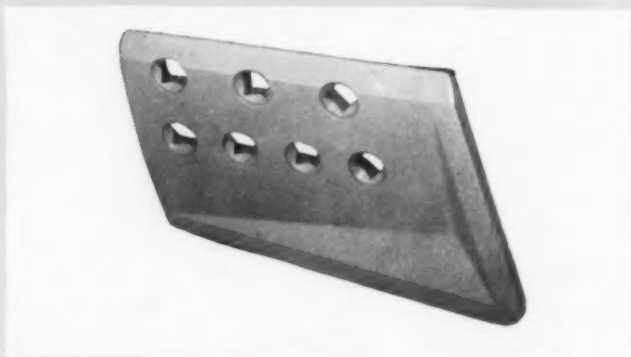
New Cat No. 8 and No. 9 Ripper Tips outproduce other brands 25 to 50% in field tests

That's the kind of news you can use—to cut costs. This newcomer to the Caterpillar line of ground-engaging tools is making a name for itself with cost-conscious users.

They're exceptionally wear-resistant—hardened to Rockwell C50 for longer wear-life under any conditions.

Check the price! Improved Cat Tips sell for about the same *or even less* than other leading brands.





They're available in two new designs. Both the short and long tips shown in the photograph are *self-sharpening* to keep their working edge until replacement. The long tip gives extra wear-life with only a slight reduction in impact strength. Low-cost, weld-on shank adapters are available for *all brands* of shanks. No need to wait—you can put these new Cat Tips on your job immediately.

In field tests the short tip was pitted against two leading brands on rippers working in caliche and cemented conglomerate beds. The Cat Tip outproduced the other brands 25-50%—representing savings of 38-54% in replacement costs.

Outstanding impact strength! One No. 9 Tip, tested in *solid* granite, took 13 smashing blows from another D9 pusher that backed up 10 feet before each charge at the stalled D9 Ripper.

And here's another money-saving newcomer—Cat's new No. 7, No. 8, No. 9 End Bits are redesigned for better digging ability. They self-sharpen as they wear away for continuing like-new performance. They're forged alloy steel and heat treated for outstanding strength and wear-resistance.

Compare other ground-engaging tool brands against the Caterpillar line. Keep machine-hour records and find out for yourself which is the best buy. Those who do, buy Caterpillar.

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PIPE LINE PANORAMA

New Contractor Group Is Formed . . . Distribution Pipeline Contractors Association was established at an organizational meeting in Kansas City August 24. Emerson H. Clark, Engineering-Construction Company vice president, is the group's first president. **Twenty-six contractors from 14 states were granted charter memberships,** with 20 more applications expected early in September. Initial regular membership goal is 60 distribution pipe line contractors, and an associate membership of 150 suppliers and manufacturers.

New group will be headquartered in Tulsa, with operating budget of about $100,000. Search is on for an executive secretary.

Gas Industry to Set Construction Record . . . American Gas Association reports pipe line and gas distribution companies will spend $1.932 billion on construction this year, up 4.7 percent over previous peak of $1.845 billion spent in 1960.

Forecasts are that construction outlays will total $8.211 billion in four-year period through 1964, up 17.9 percent over $6.963 billion spent during previous four years. Distribution facilities will account for all of the increase, totaling $3.3 billion—nearly a billion more than previous four years. Transmission facilities will account for $2.6 billion, compared with $3 billion in 1957-1960 period.

Transmission Companies to Play Major Role in New Helium Program . . . A subsidiary of Northern Natural Gas Company will build nation's largest helium plant at Bushton, Kansas. Estimates are that 22-year contract, first to be awarded under new conservation program, will ultimately save 52 billion cubic feet of helium that otherwise would have been wasted. Cities Service Helex of New York also has signed contract to build a 2 million cubic feet per day plant on an 80-acre site near Ulysses, Kansas.

Government's goal is to have 12 new private helium plants operating at earliest possible date. In addition to above, BuMines is negotiating with Panhandle Eastern Pipe Line and Helium Conservation Corporation, Midland, Texas.

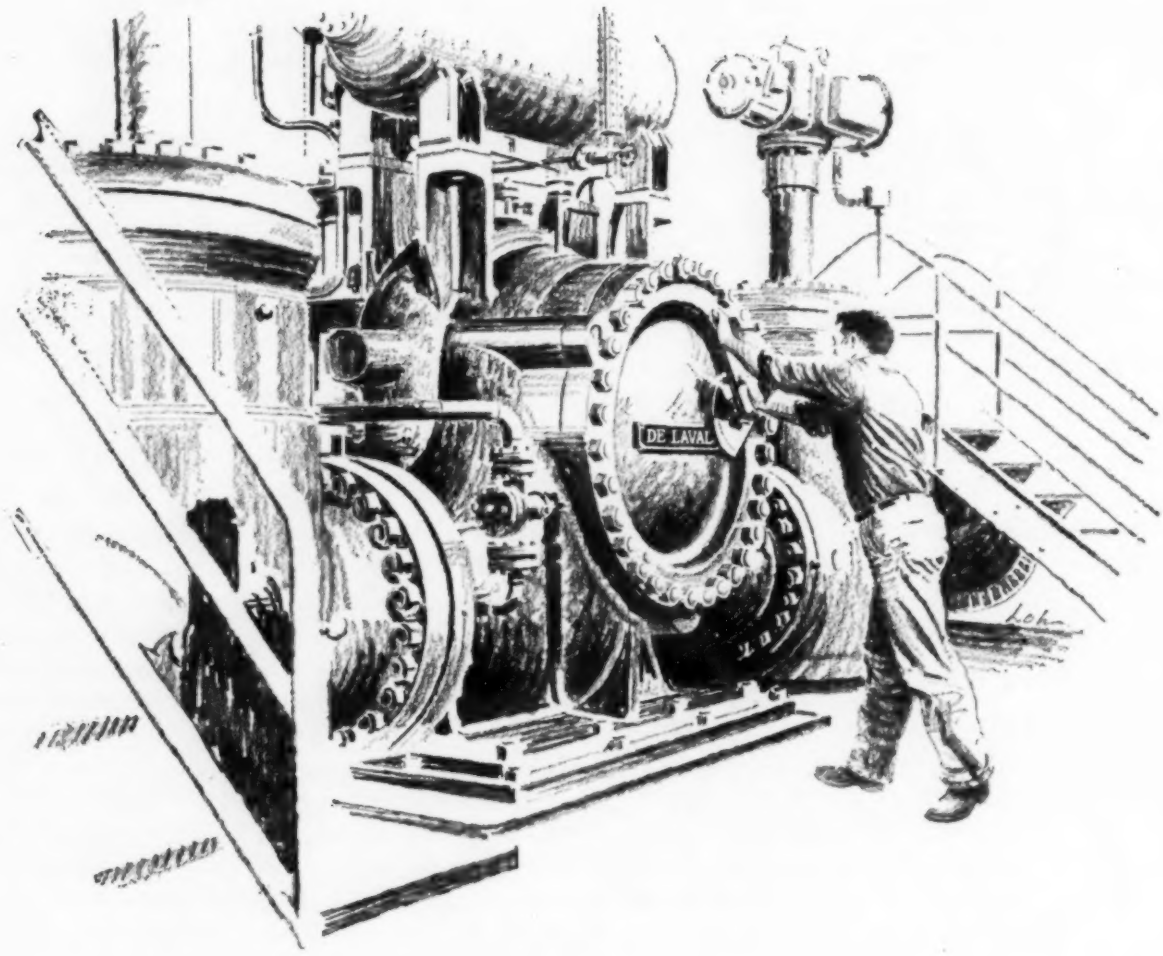
Interior Secretary Udall says he is most anxious to speed award of more helium purchase contracts, and urges interested firms to submit proposals or supplements by September 15. As added incentive to spur contracts, wholesale price for helium was recently increased from $19 to $35 per thousand cubic feet.

Pipe Line Briefs . . . Interstate Commerce Commission reports 72 oil pipe line companies had revenues totaling $185 million during first quarter of 1961, up 0.2 percent over same 1960 period . . . Bureau of Mines warns against use of the silicone chemical "silane" to keep underground water from filtering into natural gas storage. Reason: in sandstones already wet with water, silane interferes more with gas flow than with water intrusion . . . There were 72 pipe line construction applications worth $764.3 million hanging fire with Federal Power Commission on June 30, down $73.8 million from first quarter of 1961 . . . Coal has won first round in national fuels policy study—Senate Interior Committee, headed by Senator Anderson (Dem., New Mexico), has approved new resolution that will authorize the fuels study . . . latest boxscore on mass turnover in key Washington oil and gas posts: J. Cordell Moore, 49, a 25-year government career man with a smidgen of oil and gas experience, has been named head of the Oil Imports Administration, replacing Lawrence J. O'Connor who, despite Senator Proxmire, was named to Federal Power Commission. Still vacant is FPC post vacated by Frederick Stueck's sudden death; also Office of Oil and Gas Director for the Interior Department which has had a rather nebulous existence since Captain Mathew V. Carson wore both the Oil Imports and Office of Oil and Gas hats prior to O'Connor's arrival on the Washington scene . . . Rumors are that Charles Ross will fill Stueck's FPC post. Ross presently is head of the Vermont Public Utilities Commission.

DE LAVAL
engineered
flexibility
gives more flow
as pipelines grow

De Laval centrifugal compressors that boost gas through pipelines are a good example of De Laval engineered flexibility. Just two changes in parts — impellers and diffusers — increase compressor capacities and pressure ratios. Fluid flow keeps in economical step with growing demand.

Many companies face problems caused by fluctuating production levels, variable or interrupted operations, steady or rapid growth. To help solve such problems, De Laval engineers maximum flexibility into all of the many products it furnishes to industry.
De Laval Steam Turbine Co., Trenton 2, New Jersey.



MG-DL-100

DE LAVAL • 60 YEARS OF CREATIVITY AND QUALITY

CENTRIFUGAL PUMPS AND COMPRESSORS • TURBINES • IMO® ROTARY PUMPS AND HYDRAULIC MOTORS
MARINE PROPULSION AND AUXILIARY EQUIPMENT • HELICAL AND EPICYCLIC GEARS • TURBOCHARGERS

38 Ideas That Can Improve Maintenance

Compiled by
PIPE LINE INDUSTRY
Staff

LAST SEPTEMBER, PIPE LINE INDUSTRY published an article titled "These Ideas and Inventions Can Make Maintenance Easier." This was a collection of 18 ideas and inventions from 11 pipe line companies.

This article was so well received that the editorial staff decided to publish a similar feature annually. When the editors called on pipeliners in operations and maintenance to supply us with ideas for this feature this year, the response was good. The number of ideas has been increased from 18 to 38. The number of companies contributing reached 17.

The editors wish to express their appreciation to those who gave their time and effort to add to this feature for the sole purpose of passing on ideas that might prove helpful to others. In particular, the editors wish to acknowledge the help of the American Gas Association and H. M. Joiner, chief engineer of The Peoples Natural Gas Co. Many of the ideas published here had been collected by Joiner and presented before the 1961 Operating Section Meeting of the AGA in Denver.

Not all of the ideas are brand new. Some are. But many are included simply because they are valuable and not too well known.

Cutter Wheels on Trencher Slice Through Asphalt, Oil-Dirt, etc.

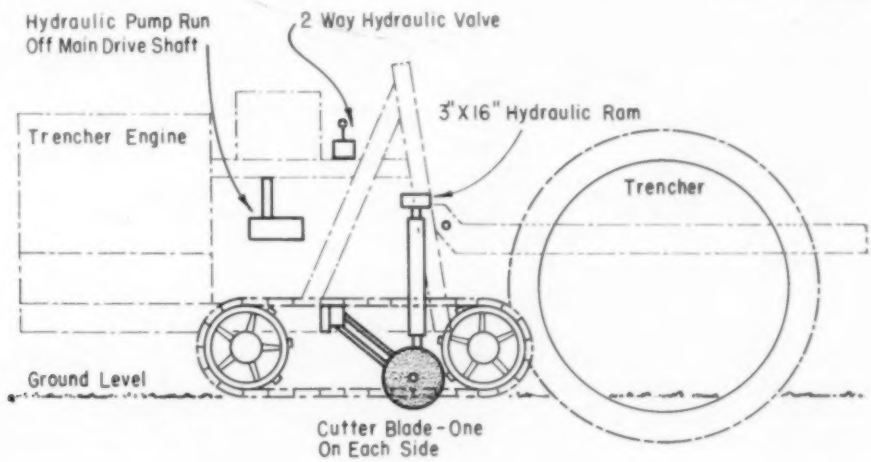
Cutter wheel attachments, installed on either side of trenchers have saved considerable money for Pacific Gas and Electric Co. They have eliminated the need to work ahead of the trencher with a pavement breaker in many instances.

The cutter wheels—which measure 12 to 16 inches in diameter—are made of ¼ inch-thick plow steel, and as the trencher moves ahead, hydraulic rams force the cutter wheels to bite into the asphalt or oil-dirt. This crease or notch enables the trencher to produce straight-line breakage as it crosses the roads.

PG&E has installed the cutter attachments on several trenchers with good results. In some cases, the cutter wheels have eliminated the need to make pavement saw cuts ahead of the trencher. "The cutter has been used successfully on certain types of asphaltic concrete and armor-coat pavement. It has a greater cutting capability when mounted on the heavier type trenchers," says a PG&E official.

The wheel is simply cut from plow steel and mounted on bearings recovered from discarded idlers. The hydraulic rams—which measure 3 x 16 inches—can be positioned by the operator. Credit for this development goes to Robert Smeltzer of PG&E.

—Pacific Gas and Electric Company



Combination Side-Cutter Teeth Improve Backhoe Bucket

Widen the outside teeth of a backhoe bucket, replacing the regular side cutter and speed up dirt work. The extra width reduces the bucket drag and eliminates the clogging of the outside teeth and side cutters.

One of the advantages of the wide teeth shows up in cutting narrow trenches. With ordinary side cutters, it is usually necessary to dig a trench a bucket-and-a-half-wide in order to make satisfactory progress. But with the combination side cutters, the trench can be cut with one pass of the bucket. This reduces labor, equipment and fuel costs.

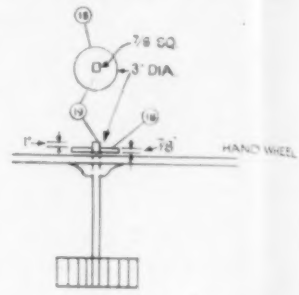
In making the wider teeth, the outside corners should be rounded and should not be as sharp as ordinary side cutters. These wider teeth pose no greater threat to the pipe than ordinary side cutters.

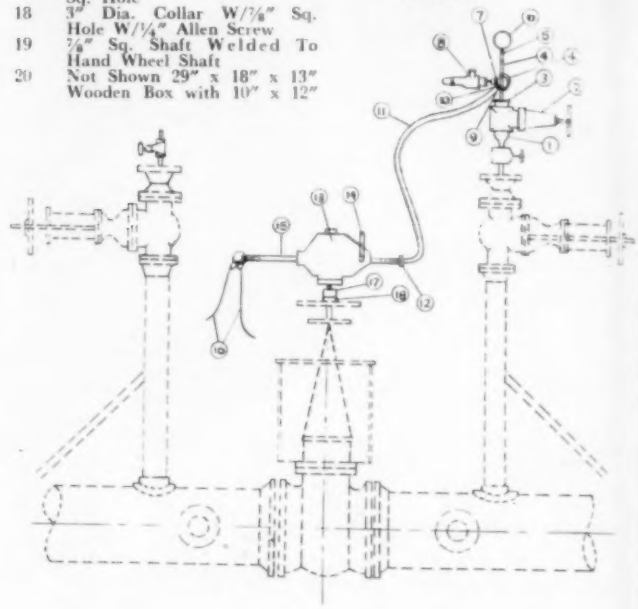
—Pipe Line Division of Panhandle Eastern Pipe Line Co., Paola, Kansas

LIST OF MATERIALS

Item	Description
1	1″ x ½″ EH Swedge NIP TBE
2	1″ Rockwell #118 Pilot Reg. 30#-75#
3	1″ x ½″ Steel Bushing
4	½″ x 6″ NIP
5	¼″ Steel Coupling
6	Ashcroft #1122-T HD Gearless Pressure Gage 0-200#, 10# Graduations
7	½″ Steel Coupling
8	½″ Crane #2651 Brass Relief Valve Male Inlet Set at 125#
9	Filtrabon #PC8F ½″ Coupler
10	Filtrabon #PC8H ½″ Coupler
11	15-½″ Gates 1000# Test Air Hose
12	Filtrabon #PN8M ½″ Nipple
13	Cleco #103AR Rev. Air Drill W/#3 MT Spindle
14	¾″ Fabricated Exhaust Extension
15	Air Drill Dead Handle Extension
16	15′-⅜″ Sash Cord
17	#3MT Shank Socket W/⅞″ Sq. Hole
18	3″ Dia. Collar W/⅞″ Sq. Hole W/¼″ Allen Screw
19	⅞″ Sq. Shaft Welded To Hand Wheel Shaft
20	Not Shown 29″ x 18″ x 13″ Wooden Box with 10″ x 12″ Pipe Wrench and 10″ Crescent Wrench

Note: Nut and threads holding hand wheel in place are cut from hand wheel shaft and ⅞″ sq. shaft is welded to hand wheel shaft. Hand wheel is held in place by tightening on Allen screw in 3″ dia., ⅞″ thick disc to the ⅞″ sq. shaft.





Make Portable Valve Operator from Rotary Air Drill

Panhandle Eastern Pipe Line Company has turned rotary air drills into excellent portable valve operators for large diameter pipe line valves. The portable operators use gas from the pipe line for motive power. The devices have proved so effective that Panhandle Eastern has equipped each pipe line maintenance district with two.

Adapting one of the drills is simple. Starting with a drill rated at 1¼ inches with a free speed of 340 rpm, a 3 M.T. spindle with a ⅞-inch square socket is added. The exhaust gas from the drill is piped away from the operator.

A high-pressure gas regulator (No. 118) is used to reduce main line pressure down to the usable range 30 to 100 psi, and a high-pressure ½-inch hose with snap-on couplers is used to connect the regulator to the operator. This entire assembly is fitted into a carrying case weighing about 50 pounds.

Each of the valves must be adapted for the portable operator. Gate valves are equipped with a drive matching the ⅞-inch socket. Cold roll stock ⅞-inch x 1-inch is fitted to the center post of the hand wheels. The gate valves are equipped with a bracket to hold the operator in position.

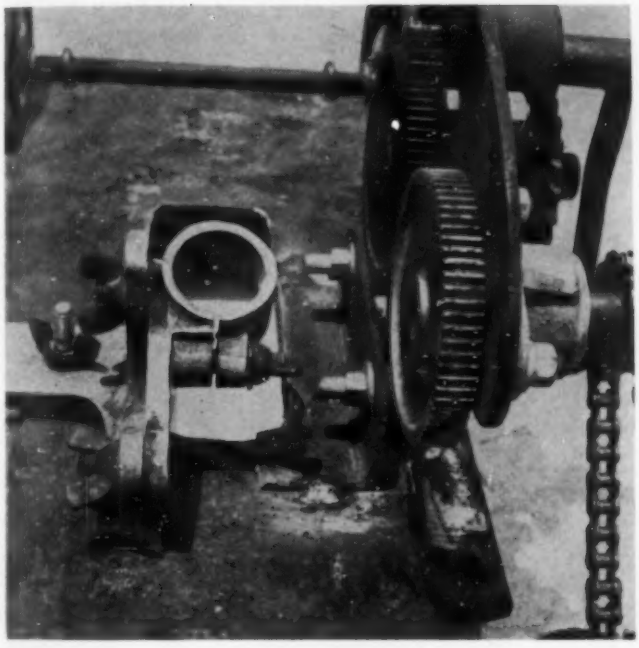
There are many advantages to this operator. It permits complete closing of main line valves during inspection (hand-operated valves would be too slow and would restrict flow). A 24-inch valve can be completely opened and closed in three minutes, using 65 pounds pressure to the operator.

—Credit for this development goes to J. N. White and W. J. Delap, Panhandle Eastern Pipe Line Co.

Four-Wheel Cart Makes Excellent Casing Splitter

With highways, turnpikes, railroad spurs etc. being constructed across existing pipe lines, casing such lines becomes increasingly important. For an existing line to be cased while in service, the casing must be split, clamped around the pipe and re-welded. Perhaps the most important part of this task is cutting the casing accurately so it will go back together without trouble.

Here is a casing splitter fabricated by Texas Eastern Transmission Corporation pipeliners. The rubber-tired cart is carefully designed because its line-up can affect the straightness of the cut. Through a series of gears, a



chain and two sprockets, the turn of the crank handle is reduced to a very slow drive for the cart. Aside from this, the only other feature of the cart is the cutting torch holder. The torch projects through the center of the bed plate on the cart (see photo).

—Texas Eastern Transmission Corporation
District IV Maintenance Crew

Light Maintenance Tractor Doubles as Weed Killer

Pipe line maintenance gangs use light farm tractors for almost everything. They make excellent weed sprayers. Here's how.

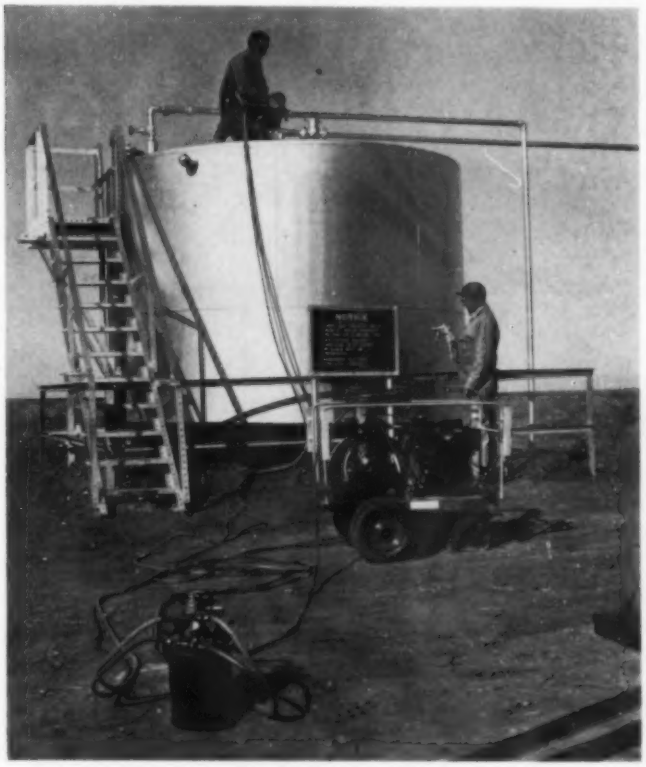
Mount a 55-gallon drum in a frame on to the three arms normally used for attaching mowers, plows and other equipment to the tractor. If the frame is made right, the tractor can back up to the loading rack and the drum can be boosted onto the arms which are pinned to the drum frame.

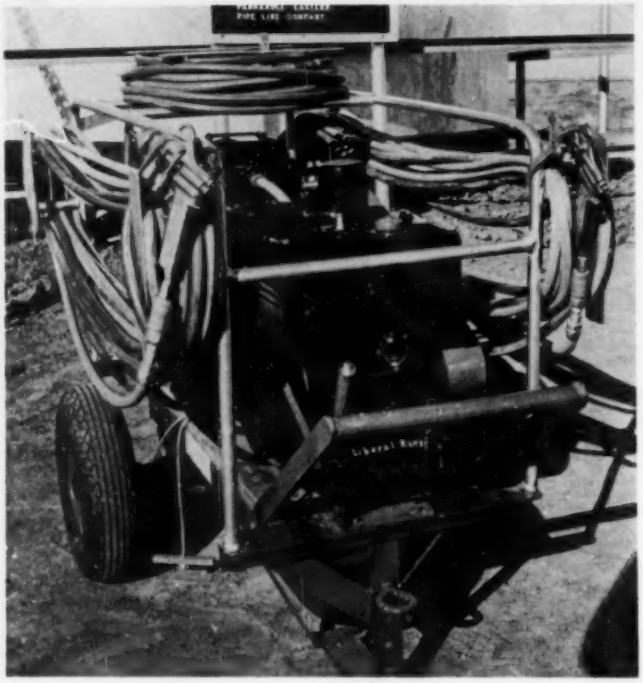
A pump, connected to the power take-off through an adaptor, produces 75 psi pressure at the discharge nozzle. The pump is connected to the suction through a short length of hose, and a 30-foot discharge hose with an adjustable nozzle completes the installation. When the device is not in use, the hose is coiled on a stationary reel attached to the drum.

—Colorado Interstate Gas Company

A Paint Cart With Electric Starter Speeds Field Work

Time was when it took Panhandle Eastern crews half an hour to set up the paint cart and after it had been used it took at least another half an hour to break it down.

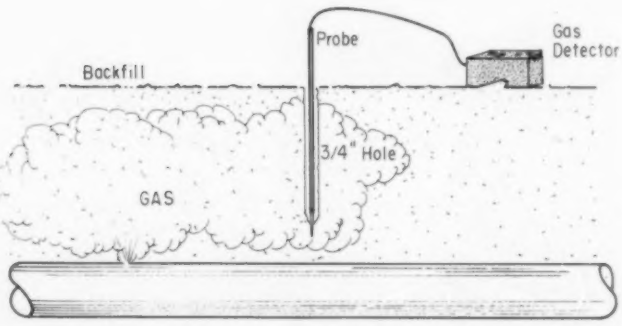




Several of the men put their heads together and came up with the solution shown here. It is a paint cart that's ready to go and ready to stop when the job is over. The gasoline engine driven compressor is started with a discarded automobile starter that cost $2. It is powered by jumper cables that can be attached to the battery of a pickup truck.

The paint pot fits in a special holder on the cart and the hoses coil on racks designed for the purpose. Another important feature not shown here is a light ramp which enables the pipeliners to roll the cart up on a pickup truck.

—Panhandle Eastern Pipe Line Company

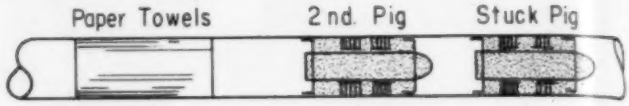


Another Way to Hunt for Small Leaks in Pipe Line

Big leaks are easy to find; small ones are not. Here is one method which has proved valuable on several occasions. Probe the backfill with a ¾-inch rod at fairly close intervals. After the holes have been open for some time, insert the lead from a gas detector in each one. Many times even very small leaks can be detected this way.

—Sibon Pipe Line Company

One Way to Recover Stuck Pig In Small Diameter Pipe



When a pig is stuck, send a second one after it. If there is some doubt that the second pig can move the first and push it on to the trap, insert two or three rolls of paper towels after the second pig. They will keep the pressure from bypassing the second pig.

—Products Pipe Line Company

Convert Winch Truck Into Dump Truck

Here's an inexpensive way to construct a dump truck. Convert a winch truck by first fabricating a detachable bed which can be sucked up onto the oil-field bed, hinged to the rolling tailgate and hoisted up and down by the winch line which is spooled over a block in the end of

a 4-inch pipe staunchion. The latter is chained to the headache rack as shown. The dump bed is constructed to hing outward so it will dump.

Credit for this modification goes to Bob Rea, section superintendent, at Columbia Gulf's Delville, La. compressor station.

—Columbia Gulf Transmission Company

Internal Pipe Cutting Machine Removes Bottom of Tank Wells

A Shell Pipe Line Corporation employe, C. E. Laughlin, invented an internal pipe cutting machine which can slice through 20 to 24-inch pipe in a few minutes time. This came as the solution to a difficult problem: The gage wells in floating roof tanks were made of 20-inch pipe. In the bottom was a blind plate with a 3-inch hole in it. This worked fine except for one thing, the well did not allow the incoming crude to mix with crude in the well, and float gages would give inaccurate readings because of the differences in specific gravities.

Cutting off the bottom of these wells was the obvious solution. But if conventional means were used the tank would have to be emptied, steamed out and made safe before the cut could be made.

The shop-fabricated internal pipe cutting machine shown here provided the solution. It is air-driven. It can

be used safely while the tank is in service. To make the cut, the machine is attached to the top of the gage well; the cutter is lowered to the proper depth, and three minutes after the air motor is started, the lower section of the pipe well falls to the bottom of the tank. Later it can be fished from the tank through a manhole.

Here's how the cutter is made. An air motor drives the cutter which has three small-diameter cutter wheels normally used in external pipe cutters. An outside shaft is used to maintain the bite of the cutter wheels. This is the novel and unusual feature of the machine. By using the spiral and pinion gear of a truck rear-end, Laughlin devised a means of forcing the cutter wheels outward. As the outer shaft is rotated in relation to the drive shaft, it causes the pinion gears to push against the cutter-wheel mounts. There is a locking device for the outer shaft just beneath the air motor.

The advantages of the new machine: (1) it can be used to cut pipe even though the area around it is inaccessible; (2) it allows cutting in an explosive atmosphere; (3) it will cut large, out-of-round pipe; (4) it cuts pipe from the inside with the controls and power for the operation on the outside of the pipe; and (5) it will cut different diameters of pipe and different lengths.

—Shell Pipe Line Corporation

Automobile Scissors Jack Modified to Handle Unloader Bottles

Texas Gas Transmission pipeliners modified an automobile scissors jack to handle compressor valve cap unloader bottles—which normally are awkward to handle during repairs and overhauls.

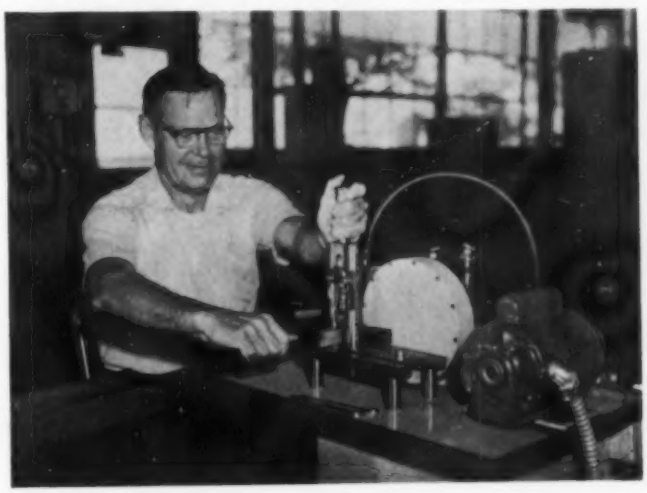
The jack is mounted on a caster dolly. At the top of the jack is a concave sphere-shaped holder made of strap steel. To use the device, scoot it under the unloader bottle, extend the jack to engage the bottle (after the stud nuts have been loosened) and let the bottle slip into the receptacle. Lower the jack and the bottle can be handled with ease.

—Texas Gas Transmission Corporation

Feather Strip Cutter Reduces Compressor Maintenance Costs

Natural Gas Pipeline Company of America purchases the hard, fairly brittle Swedish steel from which the short feather strips are cut in 10-foot lengths and the strips are cut into proper lengths for compressor valves.

The company has found that shearing is not desirable. It is apt to leave tiny fractures at the ends which can cause early failure of the strip. Cutting with a cold chisel has the same effect and the material is difficult to cut with a hack saw. Each of these methods leaves rough



edges which must be precision finished if the strip is to last long.

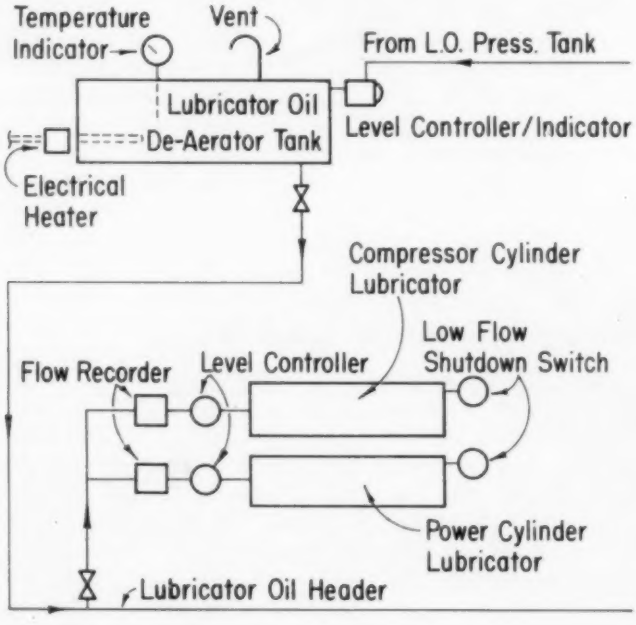
Cutting and finishing a strip took at least 10 minutes. And the strips were not top quality.

So Natural Gas pipeliners made a strip cutting machine which turns out excellent strips at the rate of about 12 per minute. The cutting element is a 7-inch diameter alundum wheel, $\frac{1}{16}$th-inch thick which turns at 7,000 rpm. A coolant circulating system keeps the strip cooling during the cutting.

The strip is held by two vises mounted on a common carriage, one on each side of the wheel. The movable vise jaws work on a toggle action for fast opening and closing. The strip steel is fed into the wheel by a lever action.

After the strips are cut, they are given a slight honing to remove sharp edges left by the cut. This additional task requires little time, and a competent machinist can average 100 finished feather strips per hour.

—Natural Gas Pipeline Company of America



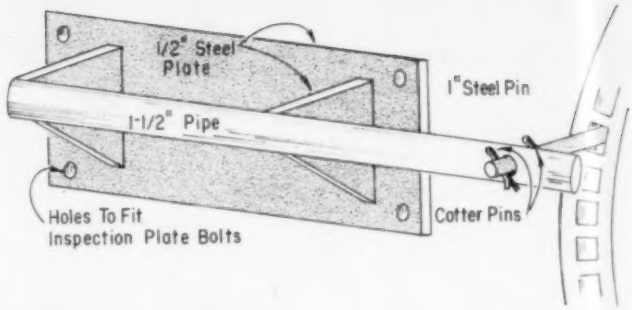
Gravity Lube Oil Feed System For Lubricators

When Colorado Interstate Company started automating compressor stations, the problem of insuring that all engine lubricators worked became very important. The first system used was to supply all lubricator reservoirs by a pressure system. But entrained air would not separate out of the oil in the lubricator reservoirs and in many instances the lubricator pumps would air-lock.

The solution was to install a gravity feed system with an aerating and supply tank overhead. An electric heater keeps the oil at 175° F, sufficient to cause the entrained and dissolved air to separate or settle out.

There has been no further trouble since this equipment was installed.

—Colorado Interstate Gas Company



Safety Locking Device For Engine Flywheel

Why take a chance on injuries during engine overhaul and maintenance? Here is a foolproof method of locking the engine so it cannot be accidentally rolled or started when someone is inside the crankcase.

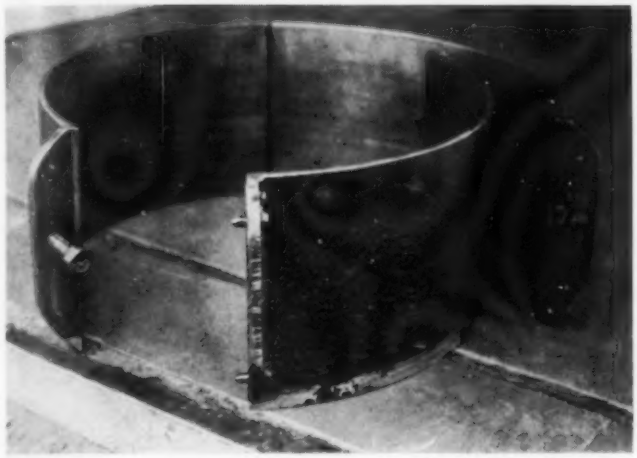
The locking device bolts onto the engine after the inspection plate nearest the flywheel has been removed. The plate is drilled to fit the inspection plate bolt pattern. Both the plate and the gussets are made of ½-inch steel. The 1½-inch extra-heavy pipe extends past the flywheel and a 1-inch pin fits through the pipe and into one of the jacking holes in the flywheel. Cotter pins lock the arresting pin in place as shown.

—Arkansas Louisiana Gas Company

Removing Connecting Rod Liners Without Removing Power Cylinder Head

On certain type engines, where there is a center opening in the power cylinder head—say for injection valve cage, etc.—an eye-bolt which will make up into power piston can be used to lift the piston and rod sufficiently to remove the connecting rod liners without disturbing the power head.

—Arkansas Louisiana Gas Company



Three Segment Entering Rig for 17-inch Piston Made from Pipe

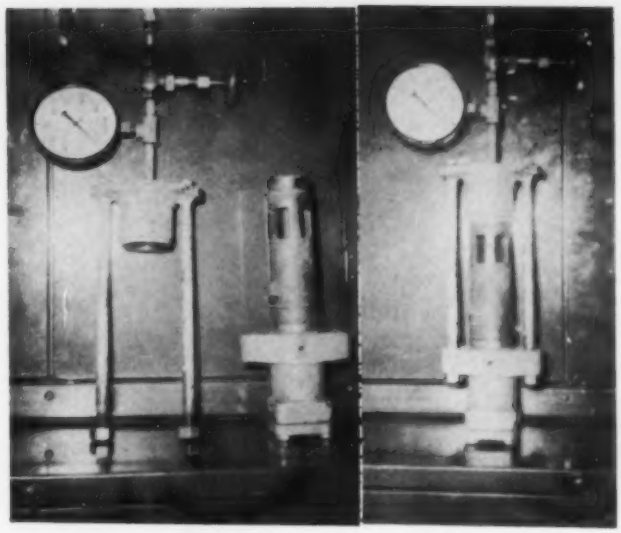
A three-segment entering ring for 17-inch pistons can be made as shown. The base of the ring has been machined to fit the counter-bore of the cylinder. The segments clamp around the piston and rings, going together with tapered dowels and a cap-screw at each joint. The cap-screws can be tightened to compress the rings for insertion.

—Arkansas Louisiana Gas Company

Install a Light in Circuit to Solenoid Valve in Water Make-Up Line

Here is an effective way to keep track of cooling water make-up. Install an ordinary light—housed in explosion-proof fitting—in the circuit with the solenoid which actuates the make-up water flow. When water is feeding into the surge tank, the light will be on. When the solenoid valve closes, the light goes off.

—Arkansas Louisiana Gas Company



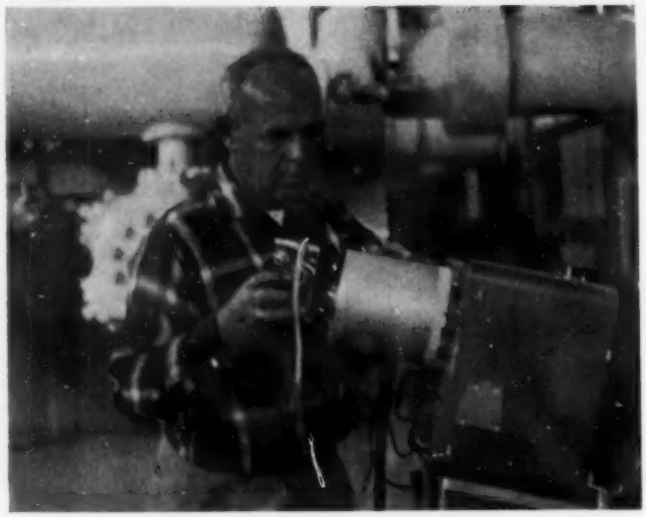
Testing Starting Air Valves Pays Off

Run a small diameter air line to the shop bench, install a valve and pressure-gage. Weld two studs to the flange of a seat as shown and you have an excellent starting air valve tester. On many engines it is highly important that the valves be tested because if the valves leak, the engines may have to be shut down to change them.

—Michigan Wisconsin Pipe Line Company

Use a Camera With Engine Analyzer to Keep a Record of Performance

The best use that can be made of most engine tests and readings of engine performance is to use them to detect changes and trends.



At Southern California Gas Company's Needles compressor station, it became obvious that if photographs could be made of the Sperry engine analyzer readings, they would provide a means of comparing inspections. As a result, a bracket for a camera and a shield to fit over the instrument were devised so that either of two types of cameras could be used. This enables operators to make photos of the vibration, pressure and ignition analysis. The best comparative results have been achieved by using negatives in strips of six exposures each. The negatives or positives are filed by engine number for comparison with later inspections.

—Southern California Gas Company

Rotary Bearings and Hose Improve Power Piston Rod Cooling on Horizontals

Cooling water from the power piston rods on horizontal engines normally flows into a slit trough from a short length of rigid pipe that traverses the trough with each engine stroke. But this open cooling water system has several disadvantages—primarily they stem from splash and lube oil contamination.

Mississippi River Fuel Corp. fabricated a closed cooling water system for removing the water from the rod with two rotary bearings and a length of heavy-duty hose as shown here. The two unions are style "P" manufactured by Perfecting Service Co. with 1¼-inch NPT female thread.

First step in making the installation is to turn the cap on the tail crosshead so that the water outlet is on top. Then, using a short extra heavy seamless 1¼-inch pipe nipple and an extra heavy 90-degree ell, mount one of the rotary unions on the tail crosshead.

At the bottom of the union (male thread) use a 90-degree ell to connect to the hose nipple and hose. The hose nipples are field fabricated from extra heavy seamless 1¼-inch pipe machined on hose end to fit 1½-inch ID hose.

Fasten the other union (outboard at left) to the tail section of the engine with a plate which has a 1¼-inch pipe coupling welded through it. (The male thread of the outboard union is made up into this coupling.)

Mississippi River Fuel says that the best hose used to date has been a 1½-inch ID hose, and the most efficient over-all length for hose and nipples seems to be 28 inches.

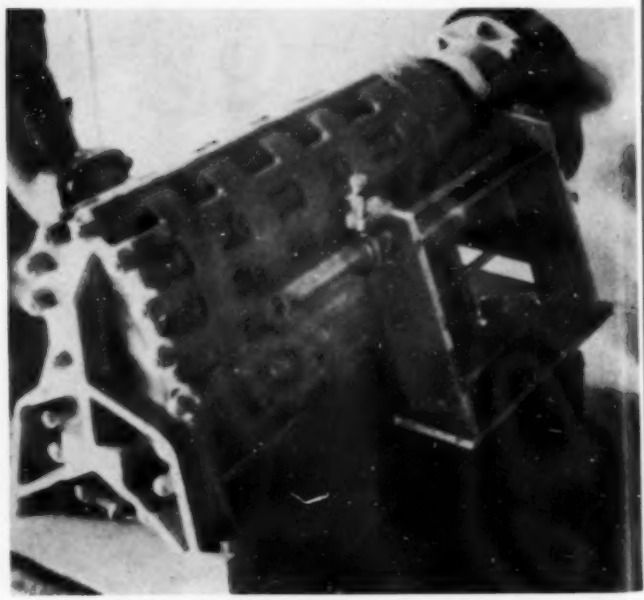
The outside body of the union at left turns and the center body of the union at right turns as the engine operates. The unions were revamped in the field and two bearings installed in place of one. They are giving good service. The only problem now is to find a way to grease them without down time. The complete installation cost for one side of the engine as shown is about $125.

—Mississippi River Fuel Corp.

Taking an Indicator Drive from a Hydraulic Oil Pump Drive

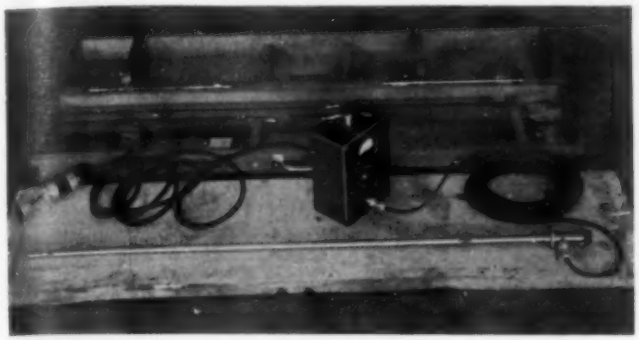
The problem was to find a drive for an MIT indicator on an engine which had a hydraulic oil pump driven directly off the flywheel. This modification eliminated the possibility of tapping the center of the flywheel for a coupling connector on a flexible drive shaft.

The problem was solved when two matched 96-tooth, 6-inch gears were obtained from a surplus store. One of



the gears was bored, sleeved and split to fit the pump drive. The second gear was mounted on a drive shaft which in turn was mounted on a bracket as shown. The gear tooth clearance is adjustable. Thus the drive is positive and the bracket can be moved when the unit is not needed.

—Colorado Interstate Gas Company



Preventive Maintenance Measure— Look Inside Engine

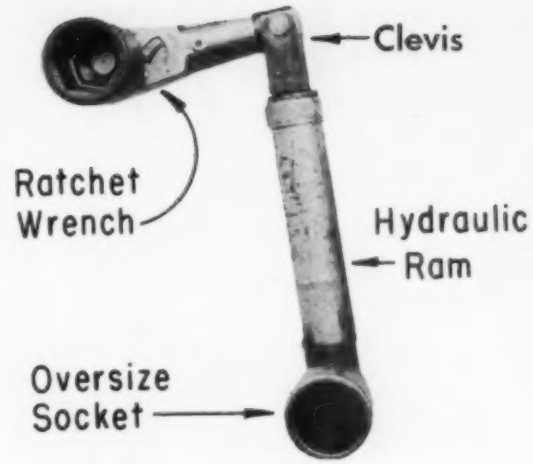
Here's a trick adapted from the field of medicine. One way to tell what's going on inside is to take a look, and there is an optical instrument available which will enable pipeliners to do just that. For instance, it is possible to remove the fuel injector cage, insert the ½-inch x 36-inch tube and examine the interior of a cylinder for carbon deposits at the ports etc. The cylinder wall can be inspected, too. This same instrument can be used for heat exchangers.

—Southern California Gas Company

Hydraulic Ratchet Wrench Packs High Torque for Close Quarters

Here's a hydraulic ratchet wrench that can produce a high torque—yet it can be used with ease in close quarters. It was designed for the job of tightening the power cylinders of certain type horizontal engines to the main frames.

Here's the way it works: The socket at the base of the hydraulic ram fits loosely over one of the nuts on the



main frame to gain purchase for the tightening of a second nut which fits snugly into the hex-nut socket at the ratchet end of the assembly. The ram is actuated by hydraulic fluid pressure supplied by a hand pump.

Most of the details of fabrication can be ascertained from the photograph. The hydraulic ram is a Simplex 10-ton solid type R 106. The clevis which lines the ram to the ratchet wrench is welded to the plunger.

The anchor is made in two parts. A 2-inch shaft 4 inches long is threaded and made up into the bottom of the ram and tack welded to prevent backing off. The oversized socket is drilled and welded to the shaft at bottom.

Aside from its ease of use, another advantage of this wrench is that if a pressure gage is mounted on the hydraulic fluid line, all of the bolts can be stressed equally.

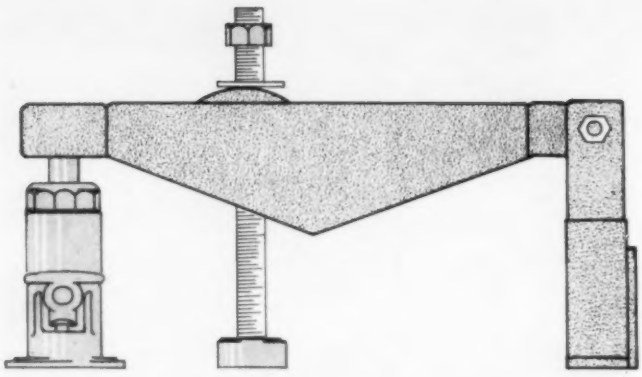
—Mississippi River Fuel Corp.

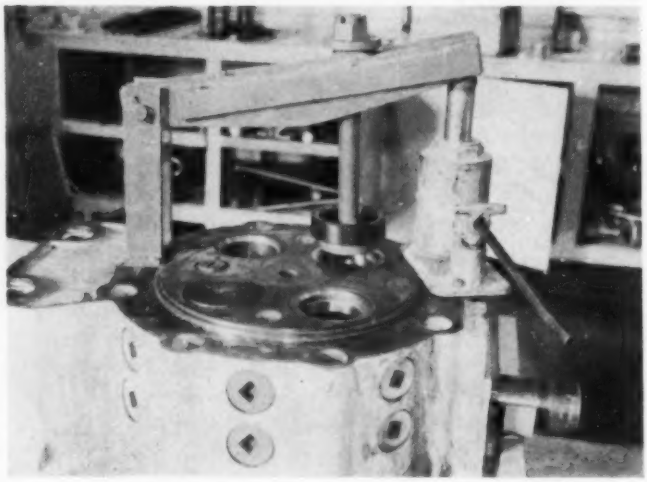
Engine Overhaul Tool And Parts Rack

Here is a portable rack for tools and parts that fits right onto the handrail of the engine catwalk. It speeds and simplifies engine overhaul and prevents scattering of nuts, bolts and tools during overhaul.

This particular rack was fabricated at Columbia Gulf's Hartsville compressor station.

—Columbia Gulf Transmission Company





Use a Hydraulic Jack and a Jig to Pull Valve Seats

Columbia Gulf Transmission Company pipeliners use a hydraulic jack and a jig to pull valve seats at several of the company's compressor stations. The jack is similar to those used in many trucks and the jig is made as shown. The entire length of the shaft is threaded and the pull is made against the washer and hex-nut. Note that the jig has a rounded boss beneath the washer to prevent eccentric stresses during the pull.

—Columbia Gulf Transmission Company

Detonation Detectors Prove Valuable for Unattended Stations

The circuitry and installation ideas for this detonation detector were originated by F. E. Raymond, district superintendent for Columbia Gulf at Banner, Miss. The idea was incorporated in controls for the unattended compressor stations to sound a warning and shut down the engine under certain conditions.

Here is the way the installation works: With engine running smoothly, VB S LB and VB S RB are closed and keeping Relay "A" energized.

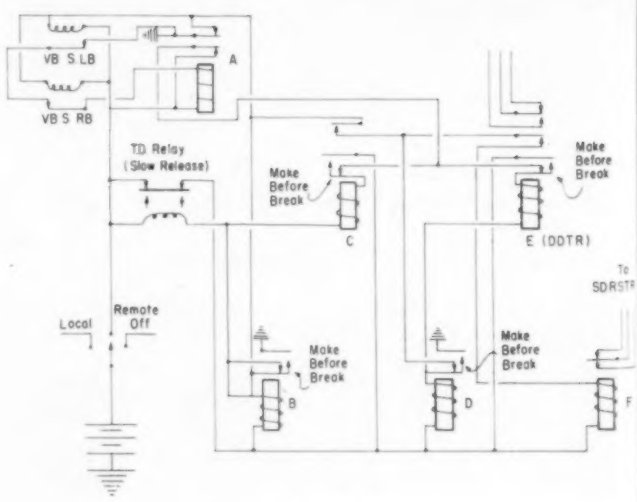
On first detonation either VB S LB or VB S RB trips releasing Relay "A". This causes the circuit to be completed through the reset coils of the vibration switches causing them to reset. This also picks up the time delay relay, picks up relay "B" and through it's "Make before break contacts", causes it to lock in. This side of the circuit has also been extended to one side of coil of relay "C".

When the tripped vibration switch is reset, battery is applied to the "Make before break" contacts of relay "C" causing the relay to operate and lock in. Another set of contacts on relay "C" is also closed, extending the circuit to relay "D" and "B".

On the second detonation within one minute either of the vibration switches again trips causing "A" to release. Time delay is already energized from the first detonation. "Ground" is picked up at "B" which resets the tripped vibration switch. "Ground" is also applied through closed contacts of "C" to "Make before break" contact at "D" causing this relay to operate and lock in. This extends "Ground" picked up at "D" to one side of coil at relay "B".

On re-energization of relay "A", battery is extended to "Make before break" contacts at relay "B" causing it to operate and lock in. When this relay operates, other contacts cause a "detonation warning".

On the third detonation within one minute, either of the vibration switches again trips; causing "ground" to



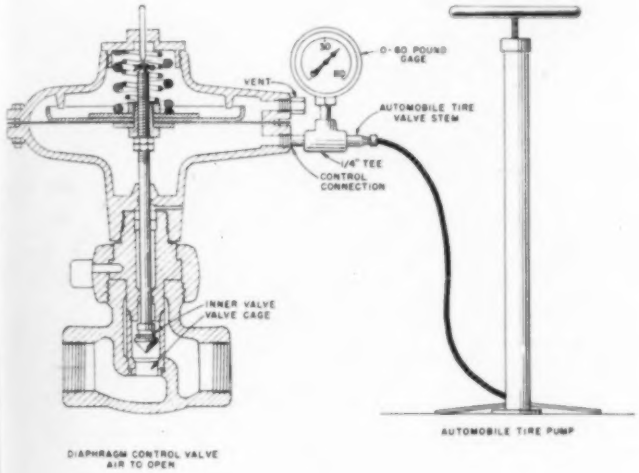
be picked up at "A" and extending it through closed contacts of "C" and "B" to complete the circuit at "F". This relay does not need to lock in because it trips SDRSTR, causing the engine to go down.

This idea was incorporated in H. M. Joiner's paper, "Gimmicks and Gadgets" presented at the 1961 AGA Operating Section Conference in Denver.

Parts used were: two vibration switches, explosion proof, 12-volt low sensitivity (0-4.5 G). They are mounted on brackets in the center of each air inlet manifold on the engine.

One Time Delay Relay, 12-volt D. C. (Time delay begins on energization.) Five relays, 16VDC. Three must have *make before break contacts*. Relay "E" DDTR is already installed in engine CTC panel, but will need to be relocated.

—Columbia Gulf Transmission Company



Use Tire Pump to Compress Spring In Control Valve

Here's a handy way to compress the valve spring in a diaphragm control valve and save time in changing a worn valve cage and inner valves. It is used widely by Colorado Interstate pipeliners.

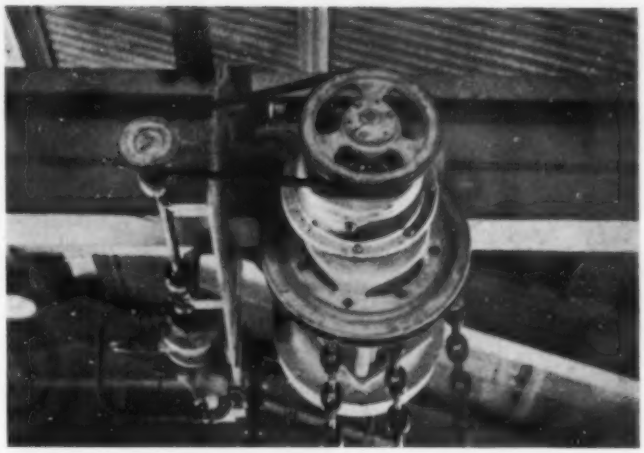
The tire pump is attached as shown with a pressure gage ranging from 0 to 60 psi. This enables pipeliners to also check for diaphragm leaks.

—Colorado Interstate Gas Company

Chain Hoist Is Easily Converted to Air Hoist

Your present chain hoist can be converted to an air hoist for about a fourth of the price of a conventional air hoist. Here's the way it is done:

An adaptor made from 8-inch pipe and ¼-inch steel plate is used to bolt to the chain wheel for mounting a Faulk No. 107J04 speed reducer on the chain wheel. A piece of ¼-inch plate welded to the side plates of the hoist serves as a mount for a ¾-inch cross-shaft with

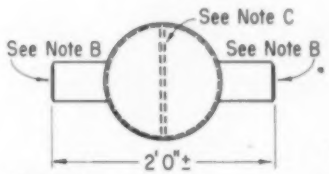


pillow block bearings. Also mounted on the plate is a Gast No. 8AM-FRV-LA reversible air motor and a Hannifin No. P-5 half-inch four-way valve. The speed reducer is driven by the air motor, shaft, sheaves and "V" belt.

Aside from its low cost, one of the chief advantages of this hoist, is that it can be easily converted back to a chain hoist. (The belt is removed and the chain is put back on as before.) Another advantage is the adequate head room. One of these converted hoists was worked on the beam of a crane with a conventional air hoist for eight hours a day, seven days a week for three months. Both hoists were subject to considerable overload and the converted hoist actually proved to have a superior breaking capacity when the overloads were involved.

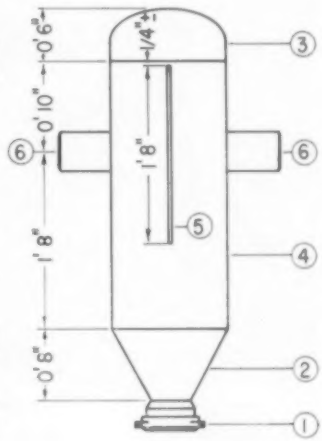
Mississippi River Fuel has 10 such converted hoists in operation. The cost of each complete installation runs just under $300.

—Mississippi River Fuel Corporation



Material:
1—4" Yale blanking cap
2—12" x 4" std. conc. weld reducer, Gr. B
3—12" std. weld cap, Gr. B
4—12¾" OD, 250" w, 33.38#, smls. steel pipe, Gr. B
5—12" x 20" x ½" mild steel plate
6—Smls. steel pipe, Gr. B (OD of pipe nipple to match OD of regulator run.)

Note:
A. Variable—fabricate to fit into allowable space upstream of regulator.
B. Weld in regulator run or install F.S., R.F., Ser 30.
C. Weld steel plate (both sides) to inside of 12¾" OD pipe.



Dirt Trap for Regulator Run

Here is an easy-to-make dirt trap which can be installed upstream from regulators to prevent failures caused by welding beads, pipe cuttings, and foreign matter deposited in the line during hot tapping, plugging, etc.

The trap is nothing more than a vertical bottle with a baffle in the middle. It has a quick-make closure at the bottom so dirt can be cleaned out when pressure is off the line. This simple device has paid off for Panhandle Eastern's Tuscola, Ill., pipe line district.

—Panhandle Eastern Pipe Line Company

Make Solvent Heater from 30-Inch Pipe and Water Heater Controls

For removing certain deposits of combustion products, there is as yet no substitute for hot chemical solvents. Here is an excellent solvent heater. It is made from 30-inch pipe. The controls were borrowed from an ordinary hot water heater. A thermometer well was installed on one side of the heater and the top is open.

—Arkansas Louisiana Gas Company

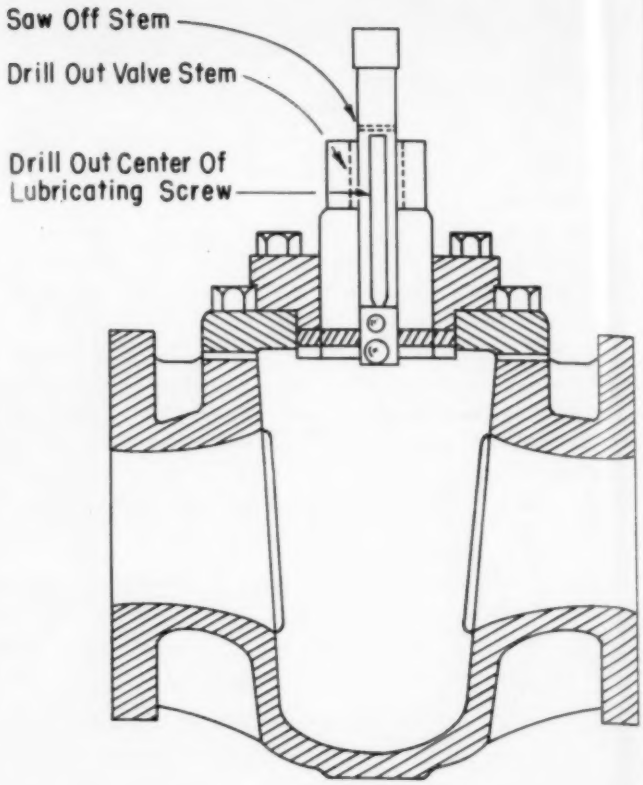
Removing and Repairing Valve Lubricant Screw Under Pressure

When the valve lubricant screw fouls or becomes broken, the valve will soon start leaking. Sometimes it is impractical to change out the valve for repairs. Here is a method of effecting this repair with the valve in service.

To do the job, you need an electric drill, with proper size bits, a pipe tap, a lubricant fitting either button head grease fitting or external lubricator—and hose to connect to a gage connection for cleaning out cuttings.

The first step in making the repairs is to back the lubricant screw out as far as possible and saw it off even with the top of the valve stem. (If the screw is broken off, steps in making repairs are same.)

The second step is to drill out the stem for a larger size



pipe thread. For example, if the present thread is for a half-inch lubricating screw, drill out with a 59/64-inch bit for a ¾-inch pipe thread tap. Clean out the cuttings with a hose from the gage connection, after both drilling and tapping.

The third step is to drill on down with a quarter-inch drill bit in the center of the lubricating screw going on through to the end of the screw.

The fourth step is to clean out cuttings that may have fallen below the end of the lubricating screw, by inserting a ⅛-inch acetylene welding rod down against the lubricant check valve and tapping the end with a hammer. The escaping gas will remove the cuttings and the old grease below the screw. (Wear leather gloves and goggles while performing this operation.)

The final step is to install the grease gun fitting or external lubricator and the valve is ready for lubrication.

This idea was worked out by Ralph Shirley, Kansas-Nebraska's transmission superintendent.

Kansas-Nebraska Natural Gas Company, Inc.

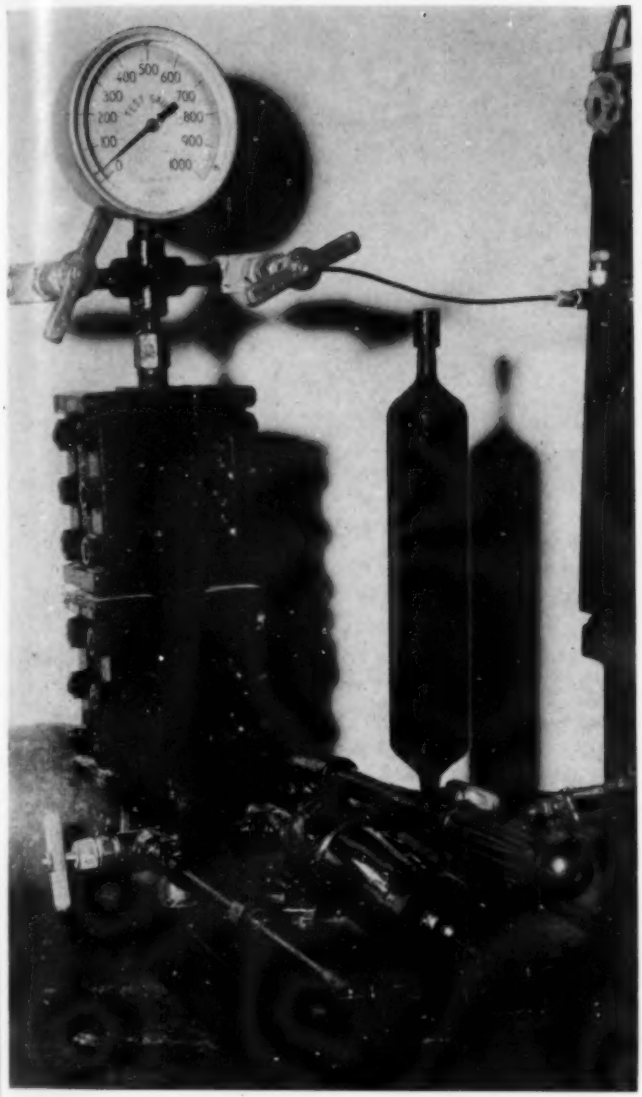
Inexpensive Pump Raises Pressure of Gas Samples for Compressibility Tests

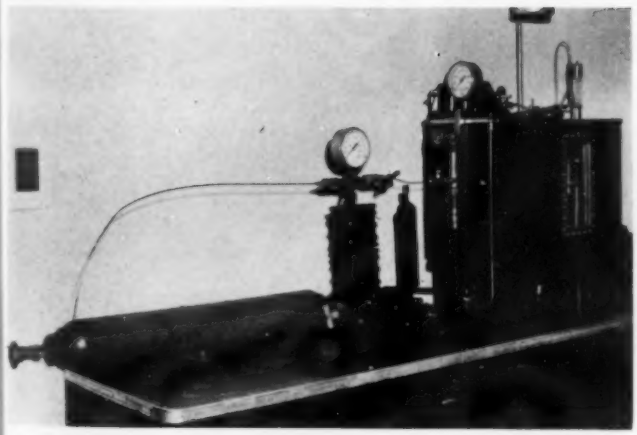
Texas Gas Transmission Corporation measurement personnel developed this inexpensive means of raising the pressure of gas samples to determine compressibility factors.

The pump was made from a hydraulic oil pump removed from an auto body shop jack and modified by replacing the brass plunger and sleeve with steel parts. Mercury is used instead of hydraulic fluid.

A high pressure gage glass is used for compression chamber and mercury reservoir.

—Texas Gas Transmission Corporation



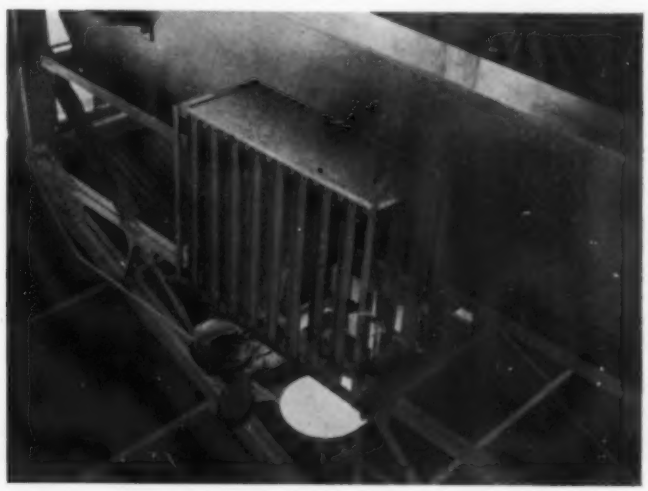


Portable Rack of Electrical Tools and Accessories

This portable rack will hold electrical tools such as grinders, drills etc. and all necessary attachments. It has ample storage for the electric cable, grinding wheels etc. and it moves about readily on casters. This rack was designed by R. W. Rea, section superintendent at Columbia Gulf's Deville, La. compressor station.

The base is made from pipe and steel plate. It has spindles for the grinding wheels. The box at the top holds center punches, levels etc.

—Columbia Gulf Transmission Company

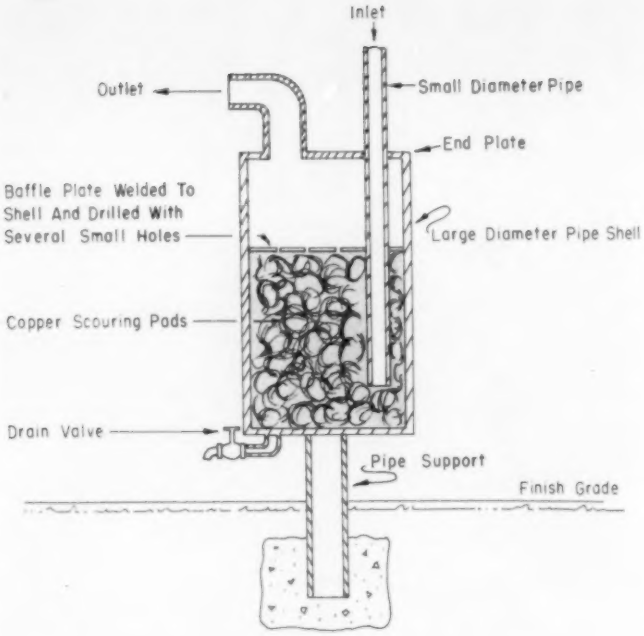


Heavy Duty Platform for Changing Bulbs, etc.

One of the hazards of station operation is the changing of light bulbs in top of the building. Here is a safe working platform made by pipeliners at Panhandle Eastern's Edgerton compressor station, Monroeville, Ind.

It was made from 3 and 2-inch angle iron, strap steel etc. The floor can be diamond plate, expanded metal or wood.

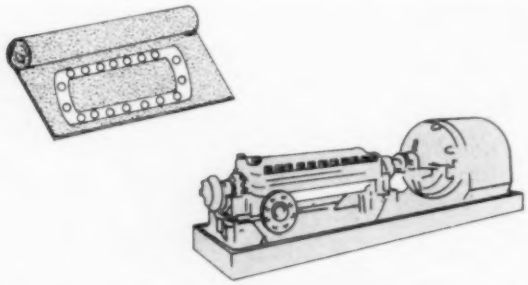
—Panhandle Eastern Pipe Line Company



Copper Scouring Pads Make Excellent Pack for Mist Extractor

This mist extractor is easy to construct and highly effective when installed on gas supply lines to valve-operators, instrument supply gas lines, etc. Copper scouring pads can be purchased at any grocery store; the kind your wife uses in the kitchen. Where gas must be unusually dry—as in the case of instrument gas—the lower portion of the vessel may be filled with glycol.

—Transcontinental Gas Pipe Line Corp.



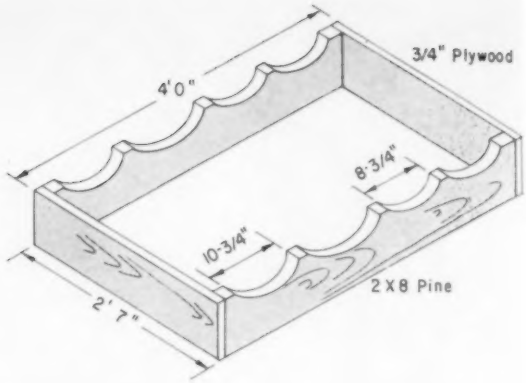
Sheet-Metal Template for Pump Case Gasket Saves Time

By cutting sheet-metal templates for all split-case pump gaskets and sorting them so gaskets can be prepared before an impeller change starts, pipeliners with Standard Oil Company (Ohio) have been able to save about two hours downtime on each impeller change. The light gage metal templates are stored along with gasket material in warehouse.

—Standard Oil Company (Ohio)

Handy Rack for Hauling Bottled Gas

Here is a rack for a pickup truck which can be easily constructed from ¾-inch plywood and two four-foot-long 2 x 8's. It has no floor and it fits in the back of the truck.



Lay the bottles of gas in the proper cutouts, and they will not roll about.

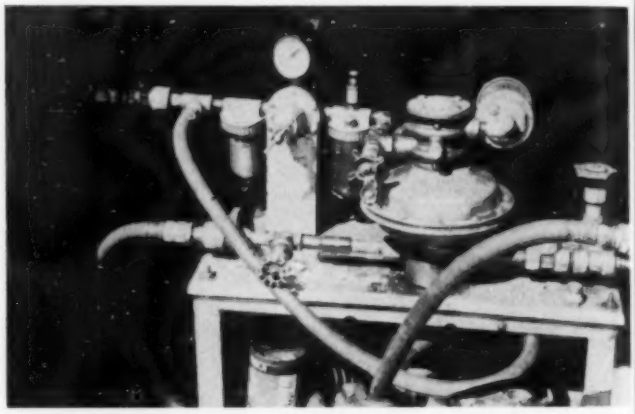
—Transcontinental Gas Pipe Line Corp.

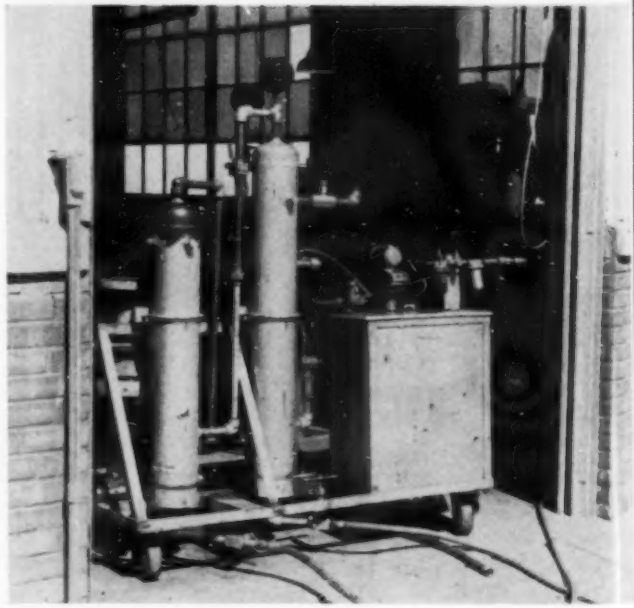
Test on Wheels

Colorado Interstate uses this portable test stand to check out safety valves and test short runs of high-pressure piping.

Its chief advantage is that no high-pressure air or gas supply is needed for its operation. The test stand is normally charged with low-pressure air and the pressure boosted by a built-in pneumatic hydraulic pump.

—Colorado Interstate Gas Company





Ideas for the Future

By **Donald M. Taylor,** Engineering Editor

Low-cost, transistorized TV camera promises to have widespread uses

A new transistorized TV camera which will sell for only $500 will likely bring widespread applications as a monitoring device in the pipe line industry. The camera will plug into an ordinary 110-volt circuit, and the picture can be monitored by any TV receiver set in working order. The developers of the camera claim the pictures are brilliant and clear.

At this price, it is likely that pipe line companies will make considerable use of the new camera. They could be used in remotely controlled stations as monitors; also, they could be used as inter-office aids to transmit or display records and drawing.

The new camera was developed by the Du Mont Division of Fairchild Camera and Instrument Corp.

New process uses natural gas to obtain temperatures up to 6000° F

The Arthur D. Little, Inc. laboratories recently demonstrated a new heat source which utilizes natural gas to produce temperatures up to 6,000 F. The work was done for the American Gas Association, and it was a result of an over-all study to find new uses for gas.

The process is a potential heat source when either rapid, high temperature heating or an intense localized heat source above 3,000 F is desired. Possible uses include open hearth steel furnaces, cutting, welding steel and other materials.

The secret of the process is a "boosted" burner, which is a device by which electrical energy is superimposed on energy derived from combustion of natural gas and other fuels.

At a demonstration held at the Arthur D. Little laboratories, tantalum was melted, and this requires at least 5,400 F to accomplish.

Could powerful odor-killing chemical stop corrosion caused by bacteria?

Add a few ounces of glutaraldehyde to the bilge tanks of a ship and kill odor producing bacteria that feed on waste and sulfur containing oil and drippings. Perhaps, the compound could be used to prevent corrosion caused by anaerobic bacteria.

Transparent film could make outdoor warehousing practical for pipeliners

The U.S. Naval Supply Research and Development Facility has found that four-mil low density polyethylene and laminations of polyethylene and mylar are excellent for military packaging. This means that they would also be excellent for pipe line packaging—for pipelining and land war have much in common so far as exposure of materials is concerned.

The Navy has found that the film rated high on all sorts of tests: tensile breaking, static load, impact strength, puncture strength, tear tests, grease and oil resistance, preservative resistance, water vapor transmission rate, corrosive test stack methods and cyclic exposure.

National Bureau of Standards starts work on $104 million research center

The National Bureau of Standards started construction of a $104 million research center at Gaithersburg, Maryland on June 14th. The first building underway is the Engineering Mechanics Laboratory, and one of the unusual pieces of equipment it will house is a one million pound dead weight machine. This is urgently needed to supplement work on the large multi-million pound thrust boosters being developed for the space program.

Later construction will include a Radiation Physics Laboratory (including a linear accelerator), seven modern interconnectnig general purpose laboratory buildings and an atomic reactor.

Pre-mixed catalyst-epoxy system has pot life of about six months

A new pre-mixed catalyst-epoxy system has a pot life of about six months. Until now, it has been necessary to mix the two just prior to application; in some instances, pot life has been rated in minutes.

But Mereco Products Division of Metachem Resins Corp., developed formulations based on unox expoxides and latent catalysts.

Initially, the mixture is packaged for electronics applications. Soon however, the product should be available for use as as coating, adhesive or castings for other industries.

Now instant beer! and some interesting possibilities

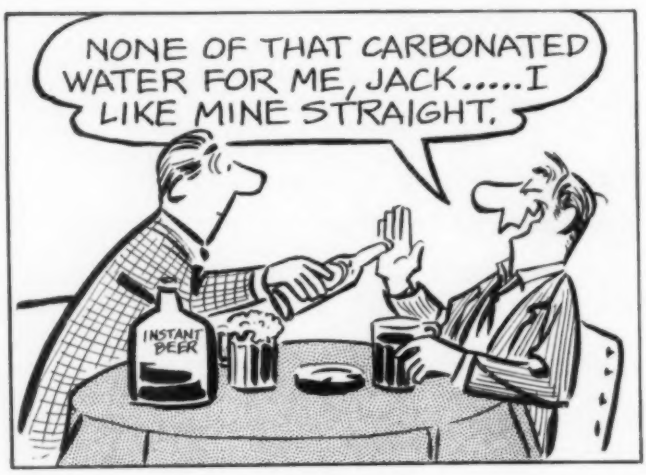
Union Carbide has found that if you freeze the water in beer, remove it by centrifuging, you will come up with the equivalent of instant beer!

The resulting liquid, composed of beer concentrate and alcohol, takes less room to store, costs less to ship and keeps longer without spoiling. To change it into drinkable suds, the consumer simply adds carbonated water and chills.

This is certainly a move toward higher efficiency in the brewing industry, and many brewers are anxious to try the idea. But I think this is carrying efficiency too doggone far!

Besides—efficiency doesn't *always* pay. Just imagine, for example, what would happen to baseball if efficiency experts took over.

Owning and operating large stadiums sized for series play, but normally sparcely filled, is inefficient. So the experts would probably institute pay TV and play the games solely for TV cameras. As for travel,—why not congregate all the teams in one city and dispense with travel? This would greatly reduce the expenses of road trips, travel delays—and from the standpoint of efficiency,



what difference would it make if the San Francisco Giants lived and played in Florida, say?

Umpires could be eliminated. Electronic devices which never make errors could take over at the plate and foul lines, and TV monitors could take care of play at the bases.

But what would happen to baseball? With no umps to boo and squabble with managers and players, and no fans to do the booing, baseball would soon give way to westerns.

The same with beer. If we swallow this beer concentrate, we'll soon be taking our drinks by capsule. And for our grandchildren, a night out on the town will go like this:

Waiter (in TV screen above table) "Come right in folks, and be seated. What'll you have tonight?"

Our Grandchild: "What've you got that's new and different?"

Waiter: "We just got some brand new capsules in; they're called "One for the Road."

Grandchild: "That's a funny name. Wonder who thought that up?"

Waiter: "Oh, it's something that came from the old days when people actually drank from glasses."

Grandchild: "What's its intoxication index?"

Waiter: "Exactly 1.077. And according to the scales in your seat, you weigh 173 pounds. The computer shows that if you take one of the model C-2 capsules every 44½ minutes you will maintain moderate hilarity. The young lady can approximate this time interval if she sticks to the A-3 capsule."

Grandchild: "Well, Here's mud in your eye!"

Cover plywood with photo of fine wood . . . and see what you've got

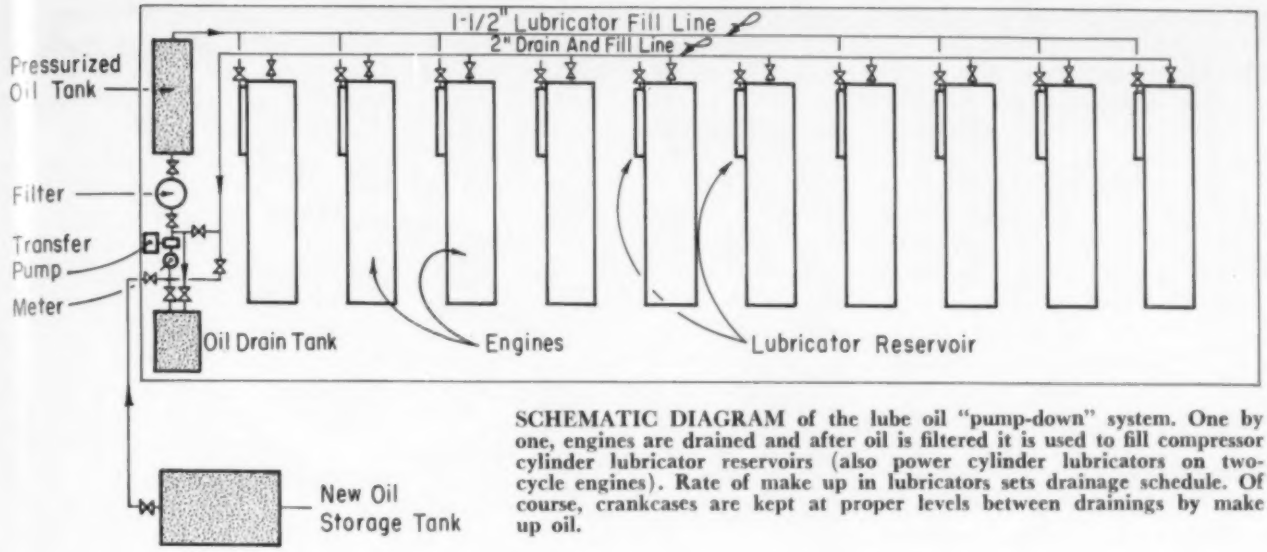
Here's the latest thing in wall paneling, and it'll make you pause and consider. It was developed by Di-Noc Chemical Arts, Inc. Here's the way it works:

First, photos are taken of fine woods—cherry, natural oak, walnut, birch, bleached walnut, etc. and printed onto a vinyl film using a gravure printing press. The plastic is then used to coat ordinary plywood. The resulting sheets are superior in many respects to fine wood paneling because they can be wiped clean easily, resist abrasion and stains that could disfigure natural woods.

Silicone rubber compound bonds steel together without a primer

A high degree of "togetherness" can be achieved by two pieces of steel, thanks to a new silicone rubber compound that bonds to steel without a primer. The tensile strength of the material is 1,500 psi; its tear strength is 200 psi, and it has an elongation of 550 percent.

General Electric is the developer of the new compound, and a company announcement said the material will simplify the manufacture of rubber rolls, oil seals, shock mounts, etc. Chances are the new compound will find many uses on pipe lines.



SCHEMATIC DIAGRAM of the lube oil "pump-down" system. One by one, engines are drained and after oil is filtered it is used to fill compressor cylinder lubricator reservoirs (also power cylinder lubricators on two-cycle engines). Rate of make up in lubricators sets drainage schedule. Of course, crankcases are kept at proper levels between drainings by make up oil.

How the 'Pump-Down' System of Lube Oil Handling Saves Money

The method enables Tennessee Gas to eliminate waste and to use less expensive oil

By Tracy S. Park, Jr.
Assistant Compressor Superintendent
Tennessee Gas Pipeline Company
Houston

BY PERIODICALLY draining compressor engine crankcases filtering the oil and using it to supply power cylinder and compressor cylinder lubricating reservoirs, Tennessee Gas has been able to effect a sizable savings at a number of compressor stations.

Background. Innovations and improvements are of great importance to pipe line companies—especially to those which operate equipment 10 or 15 years old. In fact, it is almost mandatory that basic components in the plant be modernized or otherwise improved to effect savings in operating expenses.

Probably the most important feature of a gas compressor engine is its lubricating system. With the advent of higher output, higher BMEP engines, the design of lubricating systems and the selection of oil have become extremely important so far as reliable operation is concerned. It is fundamental that if the lubricating oil is maintained clean, low in acid content, and of reasonable viscosity, the engine availability and operating efficiency will remain at a high level.

In an attempt to approach this condition, Tennessee Gas Pipeline Company has adopted what is referred to as a "pump-down" system in several of its stations. The first installation was made in a plant equipped with four-cycle compressor engines. Subsequent installations have been made at both 4-cycle and 2-cycle plants. Where it was first thought that the pump-down system would be most advantageous when used on 4-cycle engines, it has since become apparent that at least equal gains can be made in plants using 2-cycle engines.

Pump-down System for 4-cycle Engines. First consider the case of a compressor station equipped with 10 4-cycle angle-type engine-driven compressor units. Basically the pump-down system operates as follows:

Assume that an engine has been operating for 4,800 hours with the same crankcase of oil. The oil is pumped from the engine, the oil cooler, the full-flow filter, and associated piping into a tank generally located in the basement of the compressor building. The pump, which is a small positive displacement unit, then takes suction on this same tank, and delivers the oil through a full-flow filter into another tank as shown in the accompanying drawing.

It is possible to use only one tank in this system. The oil can be pumped directly from the engine through a full-flow filter and into a single tank. This tank must be of sufficient capacity to hold the equivalent of one crankcase full of oil including the volume of the piping, oil cooler, and filter. To illustrate, assume the volume of the tank to be 400 gallons.

Besides being equipped with an oil inlet, an oil outlet and a relief valve, the tank should be piped to a compressed air source and a pressure regulator to hold approximately 15 to 20 pounds of air cushion on the oil. An oil line connected to the outlet of the tank runs the length of the compressor building with small branch connections to the lubricator reservoirs on each engine. With this arrangement, it is possible to provide the lubricator

oil supply for all of the engines from a pumped-down crankcase.

The 4-cycle engines in the particular plant mentioned are provided with lubricators for the compressor cylinders only. The pump-down interval will be determined by the rate of oil consumption in the forced-feed lubricators. A good compressor cylinder lubricating practice indicates that approximately 2 gallons per day should go to the compressor lubricators or 20 gallons per day for the 10 engines. This means that each one of the engines will be pumped-down and refilled with new oil approximately every 200 days or 4,800 operating hours, assuming 100 percent operation. Of course, crankcase make-up oil is added as required between pump-down intervals to maintain proper oil level in the crankcase. At the plant being discussed, the 400 gallons drained from each crankcase is used up in 18 to 20 days at which time it becomes necessary to drain another crankcase. In each instance the oil should be approaching 4,000 to 4,800 hours of operation at the time of draining.

Advantages of System. There are several advantages inherent in this type oil system.

1. Of paramount importance is the fact that it never becomes necessary to throw any oil away, since the oil is used in the lubricators on all engines.

2. This system will maintain fresh oil in the crankcases and practically eliminates sludge and varnish deposits in the crankcase.

3. Lubricating costs will be reduced further by the elimination of all manual handling of the oil, thus releasing operating personnel for more important duties.

The pump-down system operates in the same manner on 2-cycle engines with exception that the oil is used in the lubricators at a greater rate. The reason is that there are a greater number of forced-feed lubricators on 2-cycle engines (which provide lubrication of the power cylinders in addition to the compressor cylinders). Indeed, the power cylinder lubricators use a greater quantity of oil than do the compressor cylinders on this type of engine. Assume, for example, a station of this type which has 10 engines and in which the lubricators on each engine deliver 15 quarts per day to the power cylinders and 6.6 quarts per day to the compressor cylinders, making a total of 216 quarts or 54 gallons per day to the 10 engines. Since one crankcase plus associated piping and equipment holds 375 gallons, lubricator requirements for all 10 engines can be fulfilled for approximately 7 days after which it then becomes necessary to drain another crankcase having the greatest number of hours on its oil. Assuming 100 percent operation, the complete cycle for each engine would be about 70 days or 1,680 operating hours.

A great number of compressor stations using 2-cycle engines use straight run mineral oil. To control acid number in this type oil, it is usually necessary to filter the oil with a side-stream filter packed with Fuller's earth. The earth packs are renewed periodically, and we may assume 1,200 operating hours as the average renewal interval or approximately six changes per year. Associated with each filter change is loss of oil, considerable labor, and the necessity to repack the filter with Fuller's earth. But using the pump-down system completely eliminates these operating costs and this can amount to an appreciable annual saving.

About the Author

Tracy S. Park, Jr. was graduated from Rice University in 1943 with a B.S. in mechanical engineering. He joined the Tennessee Gas engineering staff in 1949, specializing in compressor station design and construction. In 1955 he was transferred to Operations and in 1957 advanced to assistant compressor superintendent, the position he now holds. Immediately following his graduation, Park joined the U.S. Navy for a 3½ year stint as engineering officer on board a destroyer. After leaving the Navy in 1946 he worked for Brown & Root, Inc., Hudson Engineering and for a short time was self-employed working on patent developments in the field of heat exchange.

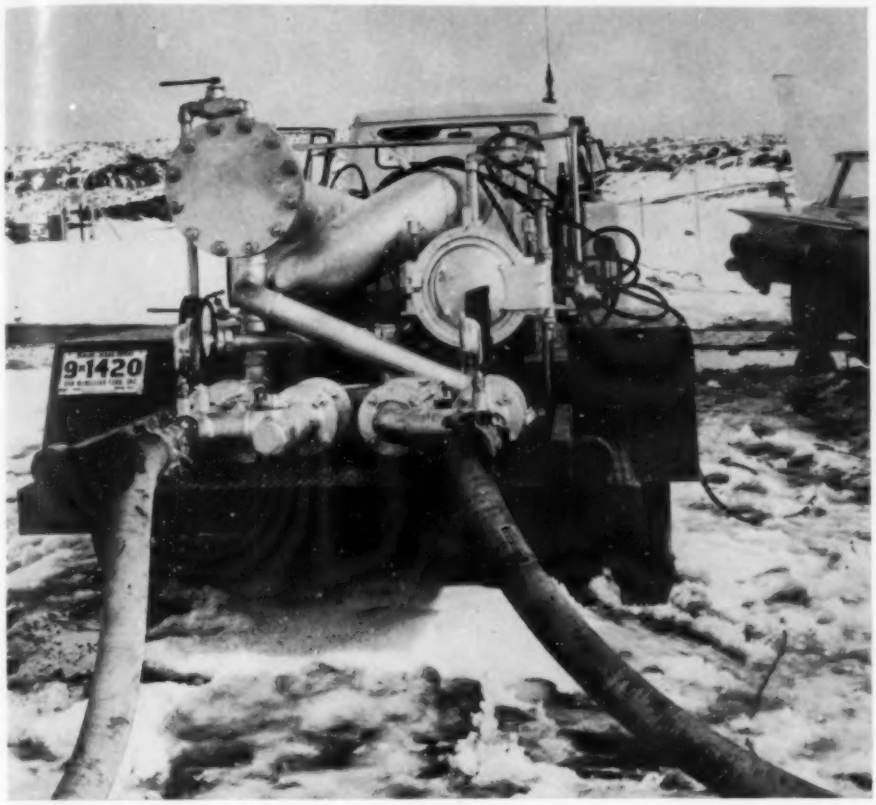
The pump-down system is ideally suited to a plant using straight run mineral oil, and in particular an oil which has no oxidation inhibitor. Because this type oil is the least expensive, appreciable savings on new oil purchases over a 12-month period can be realized. For those operators or plants which prefer to use compounded lubricating oils with oxidation inhibitor, detergent, and dispersant additives, the pump-down system still maintains its superiority. This is primarily due to the fact that it never becomes necessary to throw oil away. It is doubtful indeed, that very many of the recent detergent type gas engine oils could be run indefinitely without periodic drain and refill of the crankcase. This is certainly true of 4-cycle engines, and to a lesser extent of 2-cycle engines. Even when operated for long periods of time without change, it would be most difficult to maintain desired values of viscosity, acid number, color and good lubricity.

The accompanying simplified single line sketch illustrates the basic components of the system which are (1) transfer pump having a capacity of about 40 gallons per minute, (2) a meter connected and installed on the suction side of the pump. (This is not absolutely necessary but very desirable from the standpoint of keeping track of pump-down and refill quantities.), (3) a drain tank which is not absolutely necessary and could be classed as optional, (4) an oil pressurized tank which can be fabricated from a piece of 30-inch pipe, (5) an oil filter, and (6) associated piping shown on the sketch. In older plants which have been converted to the pump-down system, most of the piping shown is already installed and can be altered without too much expense.

There are several methods available for getting the oil from the pressurized line into the individual lubricator boxes. The best method is the one which results in the least effort on the part of the operator and which costs less. Several alternatives are being tried at Tennessee Gas compressor plants, but it is somewhat premature to describe them at this time.

ACKNOWLEDGMENT

The basic idea of a pump-down system was conceived by C. M. (Bill) Floyd of Humble Oil & Refining Company. Tennessee Gas has elaborated upon the basic principles and with a system of piping, valves, and tanks has provided an installation of maximum utility to the compressor operator.



PORTABLE PISTON TYPE PROVER FOR LACT UNITS. This is a bi-directional unit, the flow can be reversed, and the spheroid will trip detectors in reverse order. Electronic tachometer will take meter readings regardless of direction. In just a few minutes time, this portable unit can calibrate a single meter or a bank of meters. This unit belongs to Shell Pipe Line Corp. Pipe loop is eight-inch and holds 100 gallons.

New Developments in Meter Proving Techniques

What latest piston-type provers can do, and how they are instrumented for automation

By D. A. VAN SCOY,
President, Vanguard Engineers, Houston

MANY OF THE ADVANCES in metering accuracy during the past 10 years have come as a result of improvements in meter proving or meter calibration techniques. And the newest and perhaps most far-reaching improvement is a short-run, on-stream prover which utilizes an electronic tachometer to produce a super sensitive meter reading. The electronic counter is started and stopped by a piston or spheroid traversing the short run of pipe. Through interchanges and valving, the run can be made in a very short time and repeated at will. The installation is ideally suited for automatic controls.

The most important advantage of piston proving is that the meter is actually on stream and running at the start and at the finish of the proving run. The entire calibration is carried out during normal operations.

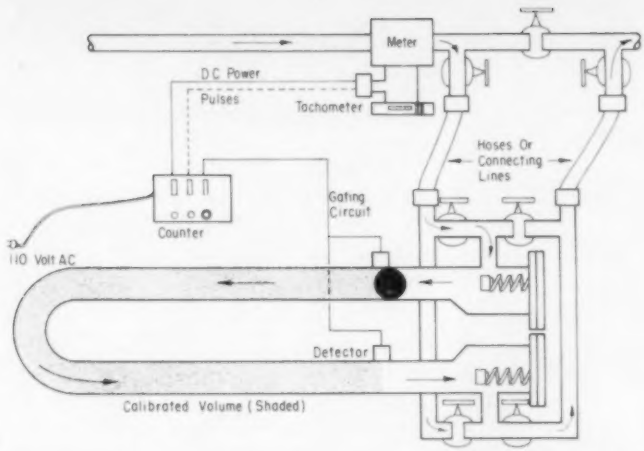
A natural outgrowth of this piston proving technique is a portable meter-proving unit for LACT operations, which can hook on to an average meter (or bank of meters) and calibrate it in a matter of minutes. These new prover units are easy to man—one operator is sufficient—and, if the meter manifold is properly set up, the portable unit can actually move in, prove a meter, and move out in 15 to 20 minutes.

Background. Piston provers started with the "measured mile" a few years ago. This method of on-stream meter proving utilized a section of the pipe line whose volume had been carefully calibrated. With the flow from a meter or bank of meters directed through the section, a piston-type pig was launched. At the beginning of the calibrated volume section, a trip switch started meter registration. At the end of the volume section, a second trip switch stopped the registration. The volume shown by the meter was calibrated against the known volume of the section of pipe line.

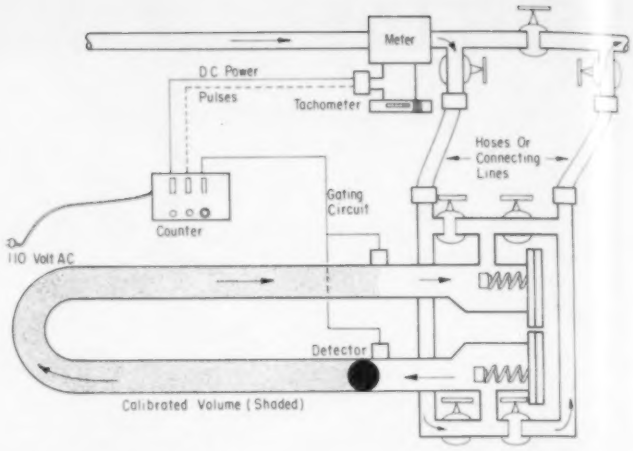
This pipe displacement method of meter proving is highly accurate. The volume of the "measured mile" of pipe line is usually large, and when this volume is compared directly with the meter reading to establish the meter factor, the results are highly accurate. The primary disadvantage of the method is that the pistons must be returned to the launching point from a receiving point some distance down the pipe line.

Improvements came quickly as engineers attacked the problems inherent in the method. They reasoned that the large volume would not be necessary if resolution of the meter reading could be greatly increased. In other words, if the required volume of a piston prover is directly dependent upon the smallest increment of measurement available through the meter's registration, why not reduce that increment?

Work along these lines proved fruitful; and engineers have achieved a higher resolution of the meter's unit measure by attaching an electrical impulse transmitting device—either magnetic or photoelectric—to the output shaft of the meter. The in-



HOW THE PISTON-PROVERS WORK. The sphere is launched by ball valves, and as it traverses the carefully calibrated volume loop, it trips detectors which start and stop reading from meter.



This reading is made by electronic tachometer which transposes gallons into, say, 1/1000 gallon for calibration purposes.

strument produces a high number of impulses for each turn of the rotor. These impulses are recorded or counted by an electronic counter which starts with the proving run and stops when the piston ends the proving run.

To be more specific, suppose a meter which normally registers one gallon per revolution of the output shaft has been fitted with a pulse transmitter that sends 1000 pulses to the counter for each gallon that goes through the meter. Then, each pulse would represent 1/1000 of a gallon metered.

For proving purposes, it is necessary to count only those impulses received during the proving run. Therefore, detectors must be placed at the upstream and downstream limits of the calibrated volume. And the count must be started when the piston (sphere) engages the first trip switch or detector at the beginning of the calibrated section. The count is stopped when the piston engages the second detector at the finish of the calibrated section.

Several electronics companies are now engaged in the manufacture of electronic components specifically designed and matched for piston prover requirements. Incidentally they have developed electronic computers which can accurately record up to 1 million pulses per second with an accuracy of $\pm$ 1 pulse!

A great deal of research work has gone into the design of detectors suitable for proving purposes. Many tests have established that the spheres will actuate the detectors to produce repeatable results well within engineering requirements.

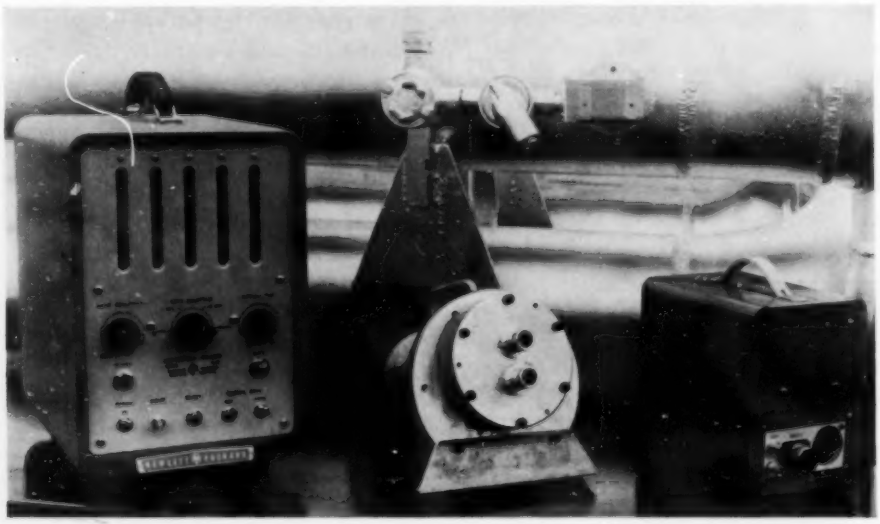
Designs of Piston-Provers. There are two basic types of piston-type meter provers: *unidirectional* and *bidirectional*. Each of these, in turn, has several models designed for particular field applications.

Unidirectional Provers. There are two basic types of uni-directional provers, the non-return, or "measured mile" type and the return, or "endless loop" design. The non-return provers, which utilize sections of the pipe line for prover volume chambers are well known and highly accurate. With their large prover volumes, they can provide phenomenal accuracy even when the direct meter registration is used for calibration against the known volume.

The return type unidirectional "endless loop" prover is fast replacing the non-return installation in present day pipe line planning. It is easily automated for 100 percent push-button, local or remote operation; and it can tie in with the most advanced systems in pipe line operations.

Basically it consists of a loop of pipe, often of complex configuration to save space, with a sphere launcher and receiver and an interchange pipe section with a special spheroid-handling valve.

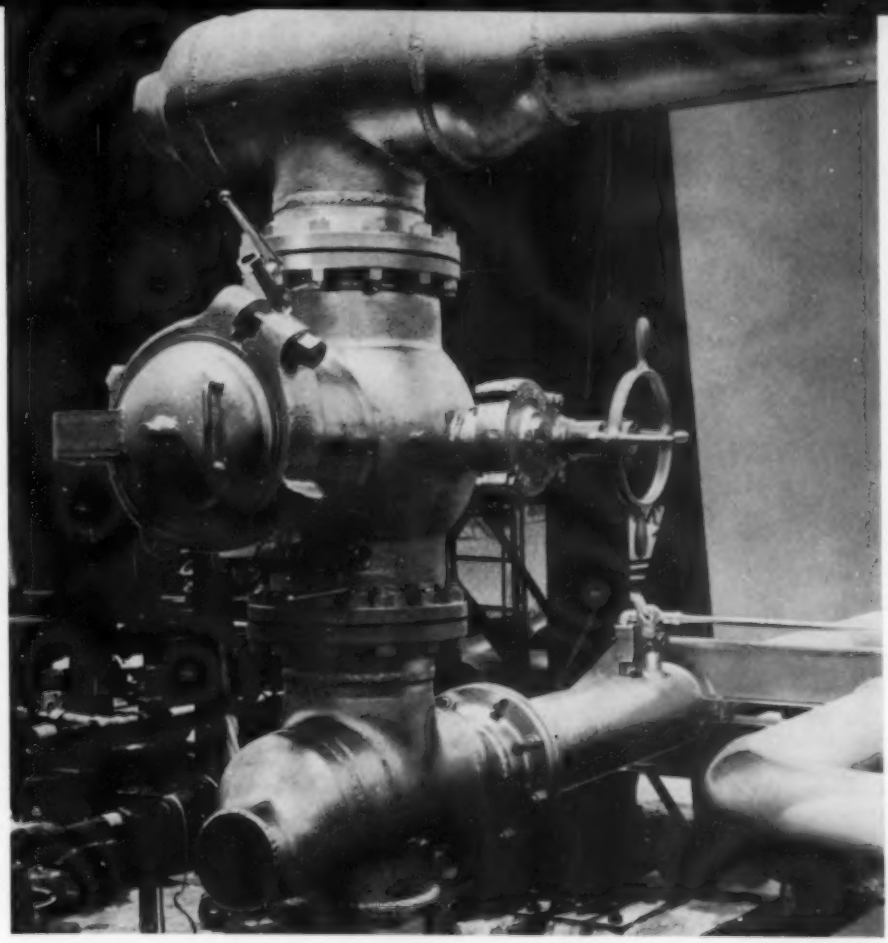
Here's the way it works: The sphere is inserted in the valve which



INSTRUMENTS ON TRAILER MOUNTED UNIT belonging to Shell Pipe Line Corp. The electronic counter at left, records pulses from transmitter attached to the rotor of meter being tested. The tachometer assembly—driven off meter output shaft by flex-shaft not shown—converts meter's output revolutions into thousands of electrical pulses. This particular tachometer is photoelectric type. At lower right is separate gated circuit used to supplement circuitry in counter to provide a means of starting and stopping counting when energized or de-energized by detector switches. A detector switch is directly above the tachometer.

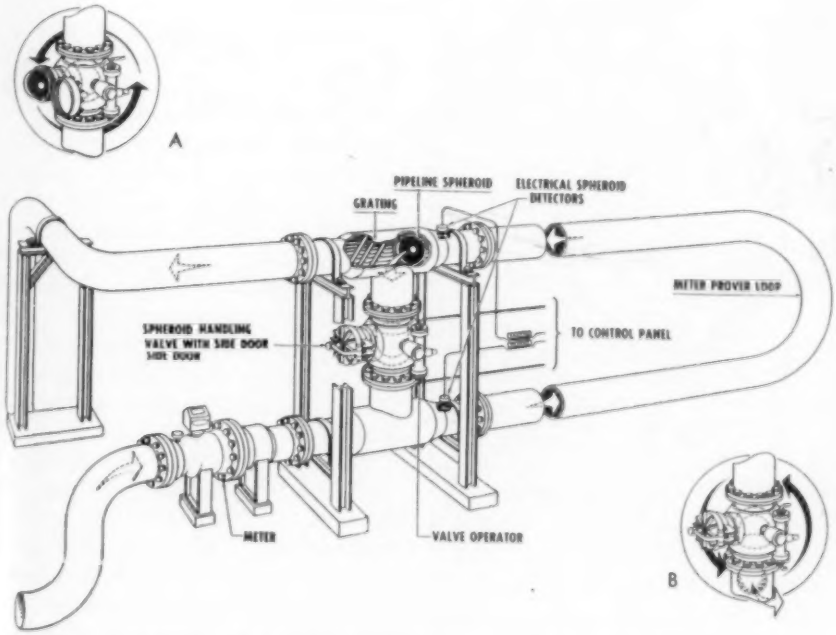
is an over-sized ball valve with a recess for a sphere in the ball. (The bore of this recess is blanked off; there can be no flow through the valve.) Upon command, the valve drops the sphere through over-sized piping into the stream flowing from the meter. The sphere is swept into the prover volume loop where it successively actuates the "start" and "stop" detectors. These start, then stop the electronic impulse counter which is in effect a highly sensitive readout from the meter under test. As the test ends, the sphere travels on to the top of the interchange where it enters the over-sized tee mounted above the valve. Here it is separated from the stream, aided by jail bars installed across the tee, and it drops into the open cavity in the valve. The run can then be repeated, by rotating the valve 180 degrees. This drops the sphere into the launch tee. However, by rotating the valve 90 degrees, the cavity aligns with the outlet, and the sphere may be removed for inspection, resizing or replacement. Electric, hydraulic, or pneumatic operators may be used to actuate the valve.

The endless loop with the sphere interchange system is a very practical method for proving meters at flow rates above 1000 gpm. In some cases, where the meters are small the initial installation may be somewhat expensive.



CLOSE-UP OF INTERCHANGE UNIT on uni-directional piston prover. In the center is a special sphere handling valve which has recess for holding sphere. To insert sphere turn valve cavity toward closure and push the valve through the opening. To launch the sphere, turn the valve cavity downward. At the end of run, the sphere enters the over-sized tee at top, then drops down into valve cavity (after valve has been turned 180 degrees from launching position).

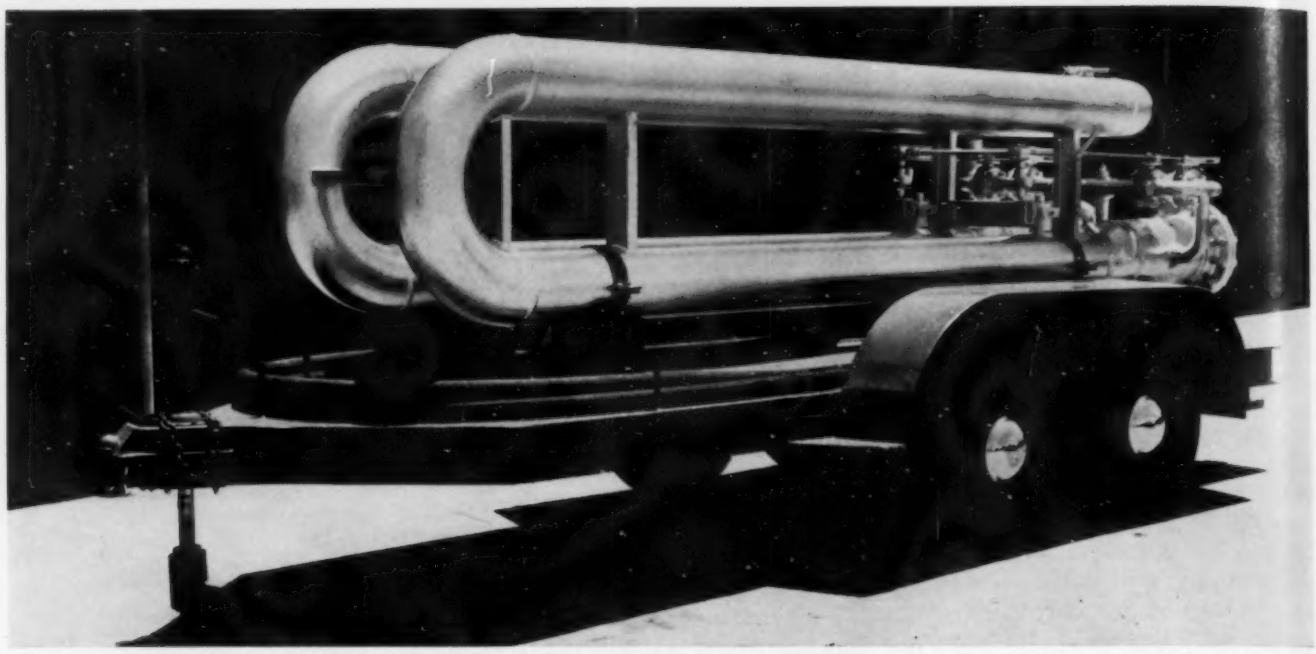
Bidirectional, reciprocating piston units are well suited for LACT installations. They are easily adaptable to compact piping and manifold designs for portable and semi-permanent installations. Here's the way they work. The piston (sphere) travels back and forth through a prover section as suitable manifolding and valves provide four-way control for reversing flow direction. The manipulation of the control valves which reverse flow causes the piston to return to its starting point. But regardless of the direction it moves, the prover piston makes calibration runs.



SCHEMATIC OF UNI-DIRECTIONAL PROVER UNIT

Many refinements have been incorporated in the manufacturing and operating techniques of meter provers. The inside of the prover section is epoxy coated to reduce wear on the spheres and possibly improve measurement through reduction of surface smearing. The addition of oversized receiving ends and shock absorber assemblies on bidirectional provers has resulted in ultra-smooth non-shock operation. Too, there have been improvements in the design of detectors.

Calibration of the Prover Volumes. Calibration of the prover volume is generally accomplished by the water-draw method rather than by master meter, although both methods are used. To calibrate the



PORTABLE BIDIRECTIONAL UNIT READY FOR FIELD. This is for low pressure installations. The manifold is two-inch.

volume of the loop between the two detectors, by the water-draw method, the piston is pumped from one detector to another, as the contents of the loop empty into certified Bureau of Standards containers. When a number of runs are made to an accuracy of 0.02 percent, the runs are averaged. The result is taken as the true volume. Corrections are made, of course, for temperature and pressure.

The desirable volume of the prover section varies with the size of meter and its rate of flow. For proving purposes, it is necessary to work in terms of one part in 10,000 to maintain an accuracy of several parts in 10,000. Thus, theoretically, the minimum volume must not be less than 10,000 times greater than the smallest increment of measure possible. However, from the practical standpoint, this soon reaches the point of no return. Experience has shown that a fair working tolerance is required for good results in the field. Allowances must be made for inaccuracies in the performance of a counter, detector, pistons and the like. Therefore, as a general rule, the 10,000 times the minimum meter registration should be tempered with "or 0.5 percent of the maximum hourly flow rate, whichever is greater."

For example, suppose we have to prove a meter which handles 800 gpm. A tachometer attached to the meter sends out 200 pulses per gallon. Theoretically then, if the prover volume is 10,000 times greater than the smallest increment of measure ($\frac{1}{200}$ of a gallon) the prover volume could be only 50 gallons. For an accuracy of 0.05 percent, we could work with an allowable variation of $\pm$ 5 counts. However, if the detectors are accurate to, only say $\pm$ one count, then this doesn't leave much to take care of any inefficiency or variation in other components and variables, in terms of counts.

However, if we base our prover volume on 0.5 percent of the maximum hourly rate of flow, our volume would be 800 x 60 x 0.005 or 240 gallons. This gives us a total of 48,000 counts per run, which in this case is much greater. We then have a working tolerance of $\pm$ 24 counts which is relatively easy to work with, even under adverse conditions.

Or, a much lower resolution of the meter registration could be used. This may be advantageous because it might in certain instances reduce the inertia caused by the gear ratios on some pulse generators. It goes without saying, almost, that a properly designed pulse generator or tachometer should have as little effect as possible upon the meter factor.

As a practical expedient, it is wise to size the prover installation in accordance with present maximum flow rates and possible increased flow rates that may result from future expansion. Often, an economic study of present and future requirements and operating costs saves money in the final prover installation.

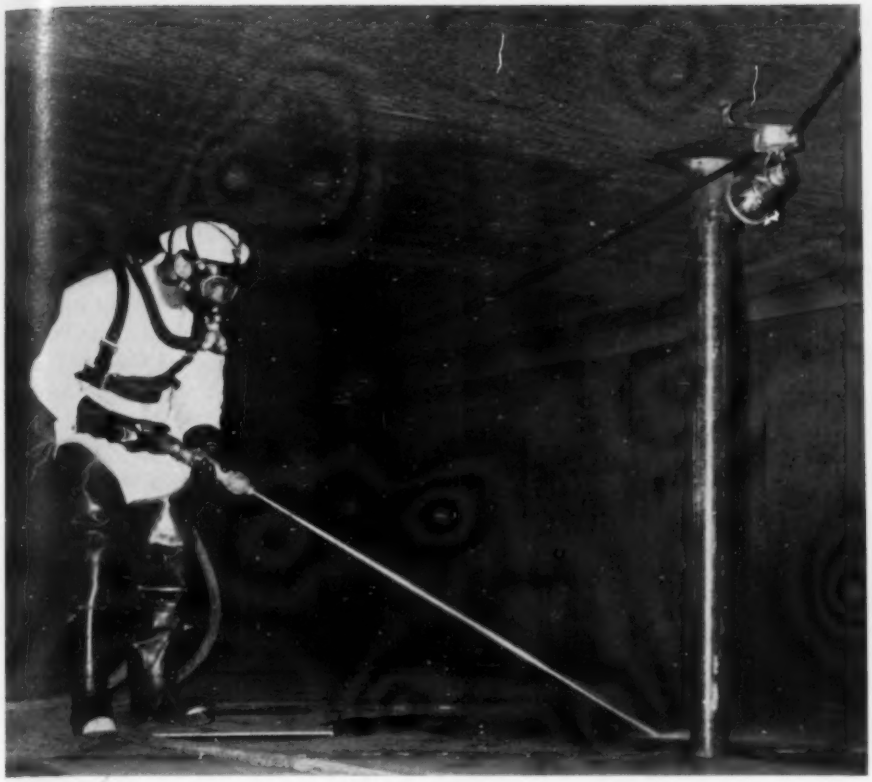
Piston provers will undoubtedly continue to be improved. And a few years from now, our present state of the art will probably seem crude. No doubt, the accuracies we now rely on will be increased tenfold.

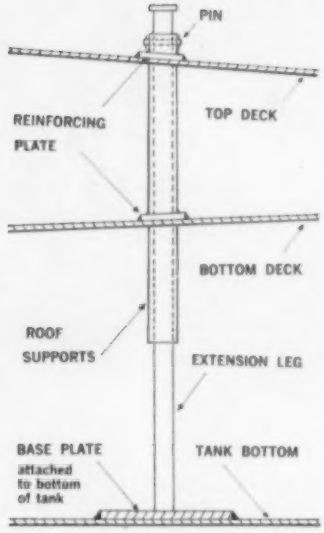
As pipe lines and meters handle ever-increasing quantities, even the smallest error in meter accuracy will tally up to a sizable run. It will be interesting to see what happens in the next 10 years in the development of both meters and meter-provers.

—The End

About the Author

D. A. Van Scoy is president of Vanguard Engineers, a subsidiary of the F. H. Maloney Co. Van Scoy was chief development engineer for three years with Maloney, working primarily with the design of specialized pipe line and related equipment. Prior to that time he performed a similar function with T. D. Williamson, Inc., as assistant chief engineer. He is a Registered Professional Engineer (Mechanical) in Texas. Van Scoy studied engineering and business administration at the Spartan School of Aeronautics in Tulsa, where he received an Associate in Arts degree.





NEW METHOD. Three-inch pipe supports inside the tank will support the roof at two positions off bottom. Low position is 30 inches; the high position is 6 feet, 6 inches. Details of the supports are shown above.

How Great Lakes Overhauled 134 Floating-Roof Tanks

By J. E. Hughes
Great Lakes Pipe Line Co.,
Kansas City, Mo.

USING REGULAR maintenance gangs, Great Lakes Pipe Line Company has set out to overhaul and modernize its 134 floating-roof tanks. Work on the project which started over a year ago will be spread over a 10-year period. The total cost is expected to run about $750,000.

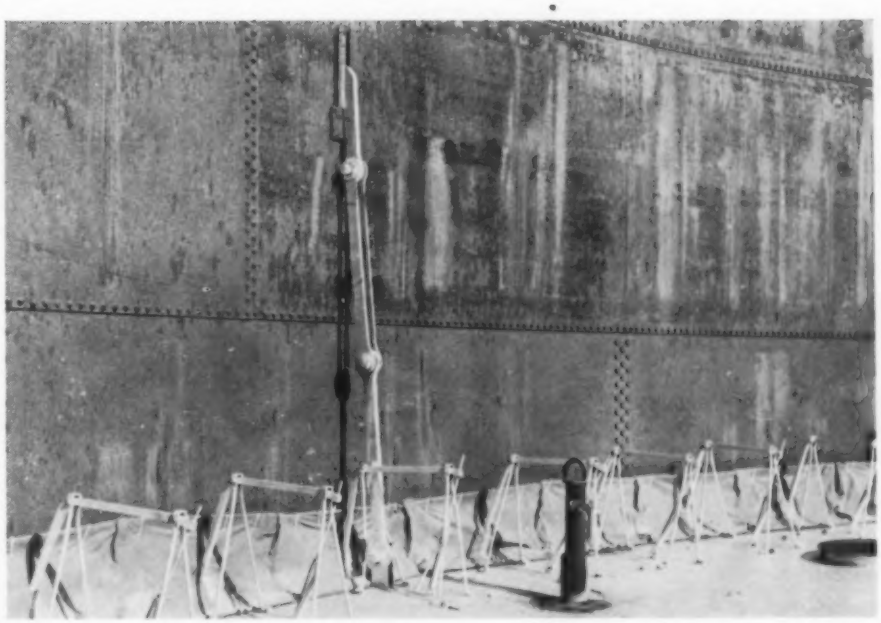
Here is a summary of the program:

1. New shoes and seals for all the tanks, and new canvas seal protectors where needed.

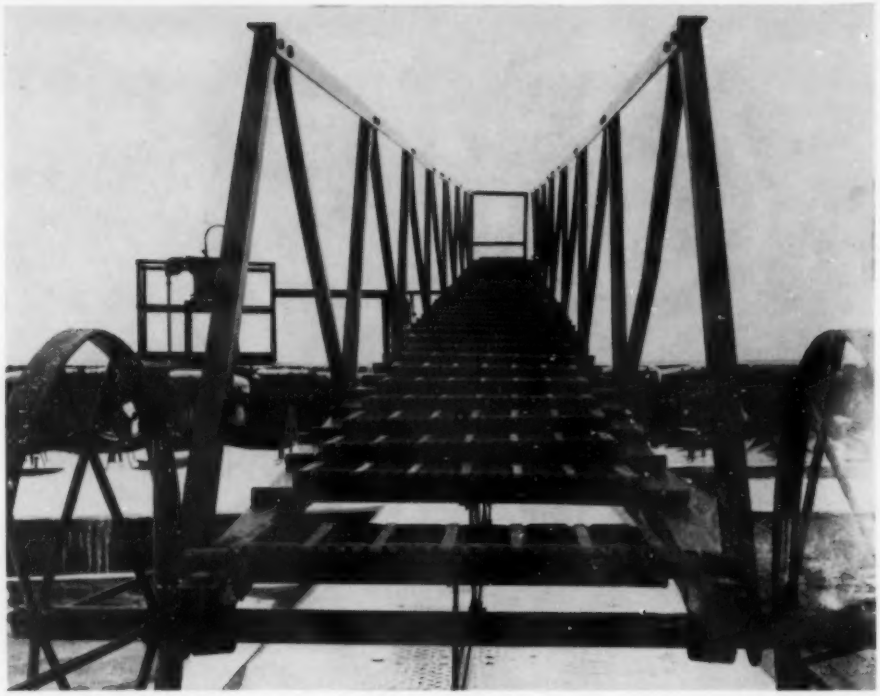
2. Replacement of the steel ladders on the roofs of 120 floating-roof tanks with self-leveling stairways.

3. Replacement of the pantograph-type roof hangers on 120 of the tanks with pipe roof supports.

4. Relocating the sump pump system in many of the tanks. Because of settling, water-draws often are not now situated at the low points of the



OLD METHOD. Using this method of supporting floating roof tanks during repairs, it was necessary to couple up hangers each time they were used. In addition, angle iron supports were used inside tanks to suspend roof off bottom when tank was empty.



STAIRWAYS REPLACE RUNGS OF LADDERS. The new units are self-leveling, making them easier to climb, especially at small angles.

tank bottoms and this has resulted in these tanks carrying excess water.

5. Cleaning the bottoms of all tanks.

6. Replacing the roof drains on 120 tanks where rust has deteriorated them.

The first three items account for more than 80 percent of the total cost estimate.

Biggest single item in the list is the shoe and seal replacement. The metal shoe, the neoprene-asbestos seal and, in some cases, the canvas protector are replaced with new units.

The other two major items—installation of self-leveling stairways and pipe roof supports—are essentially for the safety and convenience; obviously neither modification enables the tank to hold any more product any more effectively. Yet, improvements represents a third of the total expenditures.

One of the company's maintenance gangs can completely modernize a 30,000-barrel tank in two weeks, with some extra welding help thrown in. Each of the company's 13 gangs contains six men, including the foreman and two members who can weld. For a tank modernization, the second welder from two other gangs are moved in whenever possible.

The reason for the stairway modification is simple to state: It's easier and safer to walk up and down stairs than up and down a ladder. And with the roofs in varying up-and-down position, our gaugers and testers often have to make the climb from the top of the tank shell to the roof proper.

The steps are available commercially, and can simply be bolted on the rungs of the existing ladders. Great Lakes also is doing some welding on the ladders to get additional strength, but this is not absolutely necessary.

To understand why the pipe support modification is such an important change, it is first necessary to understand the present arrangement. The roof hanger system was the accepted method for suspending floating-roof tanks when the most of the tanks were constructed—many of them 30 years ago. Underneath the roofs is an extensive system of angle iron supports which hold the roof some 3 feet off the bottom when the tank is empty of product. When it is necessary for employes to get inside the tank to clean or repair it, the roof is suspended by wall hangers as shown in the accompanying illustrations.

These hangers are difficult to handle, and they suspend the roof at an awkward height—5 feet, 6 inches. This low ceiling forces most men to remain stooped when they are inside the tank. The supports underneath sides of the roofs also interfere with tank cleaning, getting in the way of air and water hose and other equipment.

The installation of the pipe supports shown makes it possible to easily lower the roof to two heights—one 30 inches above the bottom and the other 6 feet, 6 inches above the bottom. The latter provides ample room for standing and working.

Great Lakes makes its own supports out of 3-inch extra-heavy pipe.

It should be pointed out that almost all of Great Lakes tank construction since World War II has been the lifter-roof, cone-roof system. All floating-roof tanks built since 1950 have the modern stairway and pipe support features.

When the study was made on Great Lakes' floating-roof tankage over a year ago consideration was given to converting them to a cone-lifter system. The cost of such a conversion proved to be more than five times the estimated cost of the program adopted. And, too, Great Lakes prefers floating-roof tanks for jet fuel storage and in cases where the product turnover occurs more than ten times a year.

The new program is in addition to the project of welding all the seams of riveted tanks. A practice for several years, all the remaining riveted tanks will be welded during the next three years.

Incidently, Great Lakes does not empty and clean a tank before welding the rivets, but does the work while the tank remains in fuel-oil service. This obviously is less expensive and quicker and has the added advantage of requiring only a one-pass weld, since any bad welds are found quickly by the distillate in the tank.

—The End

About the Author

John E. Hughes is supervisor of tankage for Great Lakes Pipe Line Company. He has been associated with tank operations since joining Great Lakes 15 years ago. Hughes served as tank construction inspector and tank crew foreman prior to being named assistant supervisor of tankage in 1951 and was promoted to his present position in 1960.

How the U.S. and U.S.S.R. Gas Industries Compare

The Russians prefer the dreams of 1965 to the realities of 1961, says U.S. gas industry official after Soviet tour

By Donald M. Taylor, Engineering Editor, PIPE LINE INDUSTRY
From an Interview with Baxter Goodrich,
Senior Vice President, Texas Eastern Transmission Corporation

"EVERY TIME we asked an official of the Soviet gas industry a pertinent question about present-day operations, he invariably replied—or attempted to reply—in terms of 1965. The Russians prefer the dreams of 1965 to the realities of 1961."

Thus does Baxter Goodrich, senior vice president of the Gas Division of Texas Eastern Transmission Corp. sum up his impressions of the Soviet gas industry after spending 30 days inside the USSR touring the pipe lines along with seven other U.S. gas men and two representatives from the U.S. State Department.

At a press conference in Houston, Goodrich made no bones about the overwhelming superiority of the U.S. gas industry over its Red counterpart. He pointed out that on his entire trip, which lasted from July 2 to August 1, he saw only one or two ideas or techniques worth copying, and they were somewhat tepid as ideas go. The most significant one was a method of testing welds for imperfections with a magnetic tape.

According to Goodrich, the workmanship throughout the USSR gas industry is far below U.S. standards. The hustle, enthusiasm and griping found on most of our own spreads is missing. Pipeliners in Russia (about half of whom are women) seem dispirited, slow and unhappy.

Background. Back in 1959, the U.S. and Russia agreed to exchange scientific and cultural groups. As a result of this agreement, both nations are conducting tours of their respective gas industries this year. The American group which toured Russia in July will be followed by a reciprocal Russian delegation in November.

Members of the U.S. group touring Russia besides Goodrich were: Robert B. Stewart, vice president and head of the Natural Gas Department of Phillips Petroleum Co., Bartlesville, Okla.; E. H. Smoker, president of United Gas Improvement Co., Philadelphia; Paul W. Kraeamer, vice president in charge of operations for Minneapolis Gas Co., Minneapolis; Fred W. Batten, vice president of Columbia Gas System, Inc., New York City; Henry A. Eddins, president of Oklahoma Natural Gas Co., Tulsa; Samuel J. Cunningham, senior research engineer for the American Gas Association, New York City; William R. Connole, Washington, D. C. attorney and former member of the FPC; Hillis Lory, U.S. State Department representative, and Ed Wolski, interpreter furnished by the State Department.

The group flew to Moscow and toured the gas industry by automobiles, trains and planes. They visited gas fields, wellhead installations, compressor stations, pipe line construction projects and town distribution systems.

Goodrich suspected that the Russians stretched out the tour of their somewhat limited pipe line facilities with aimless train rides and delays in order to keep the U.S. delegation inside Russia for the full 30 days, so that later the Russian delegation would be entitled to a full 30 days stay inside the United States.

Yet Goodrich is not certain that the Russian delegation will profit greatly from its tour of the United States. "After all," he says, "Russian engineers and technicians read U.S. technical publications and books. They probably know almost as much as we do about our own industry."

Dream Gas in the Land of Oz. "A visit to Russia is like a visit to the Land of Oz," said Goodrich, meaning that the USSR is a topsy-turvy mixed-up world where it is sometimes hard to distinguish fantastic realities from pure fantasies.

"On our tour," he explained, "we came within sight of quite a few self-contained industrial complexes consisting of related factories, a central power plant and housing for employes. The scope and design of these installations smacked of 1975.

"Yet in village after village, our group saw only crude log cabin dwellings; and a common sight was that of women hauling jars of well water on wooden yokes balanced across their necks."

Another example he mentioned was the subway stations in Moscow. They are magnificent structures constructed some 300 feet below the surface of the ground and this is a sizable engineering feat in itself. The stations are roomy, beautifully finished and decorated with excellent works of art. The escalators which service them are perhaps the world's longest; and in themselves, likely posed a difficult design problem. "They are so long," says

Goodrich, "that you can hardly see the top from the underground train level."

In direct contrast, when the U.S. group visited compressor stations, they found themselves tripping on stairs because they had been carelessly constructed and the steps were not of uniform height.

While such disparities in progress seemed strange to U.S. visitors, they were far easier to understand than the fantasies and self-deceptions practiced by some of the Russian officials.

The old-fashioned blunders, mistakes and shortcomings common in U.S. industry and progress have no place in the Russian scheme of things. And to eliminate them, Russian officials have resorted to strange remedies indeed!

Take, for instance, the matter of accidents. When the delegation visited Russian compressor stations, they noted a number of practices (other than the non-uniform risers in ladders and stairs) which were conducive to accidents: The station housekeeping was poor; miter-weld fittings were frequently incorporated in high-pressure gas piping; and few safety devices were in evidence.

When queried on the subject of accidents, the Russians answered that accidents had been outlawed and hence presented no problem. In case of accident, the foreman is jailed!

When the group visited a pipe line spread near Tula to watch Russian pipeliners lay 40-inch pipe (See January 1961 PIPE LINE INDUSTRY, Page 41), they found construction moving at the proverbial snail's pace. On the day of their visit, the spread logged less than 1,000 feet. The Russians had a ready explanation, however. This was not a "normal" day, they explained. For on "normal" days, progress was about 2,000 feet per day!

One of the delays on the job was occasioned by the hot sun. By noon that day, the asphalt coating was running and operations had to be curtailed for a few hours. When the Russians were asked why they didn't use coal tar coating, they replied that coal tar was "harmful" and it was against the law to use it.

When Goodrich asked the Russians where the 40-inch (1020mm) pipe was manufactured, he was told that it was made in Russia. When he asked the specific location of the factory, the Russians refused to answer. However, Goodrich was able to inspect several joints of the pipe at close hand, and every single one carried markings which indicated they were made in Dusseldorf, West Germany.

Baxter Goodrich, senior vice president in charge of the Gas Division of Texas Eastern Transmission Corp., points out the route he and seven other gas men and two State Department officials took to inspect the Russian gas industry.

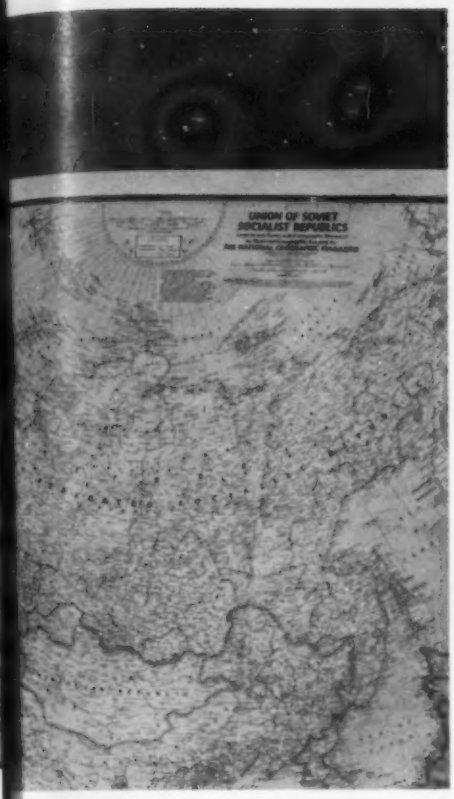
The Propaganda of a Race to Nowhere! Chances are Russia will never catch the U.S. in the number of miles of pipe line constructed or in the volume of gas handled. The United States has about 184,000 miles of cross-country gas pipe lines, 58,000 miles of major field gathering lines and some 387,000 miles of gas distribution lines. What's more, in order to continue to meet its growing market, the U.S. companies are constructing about 10,000 miles of new lines every year.

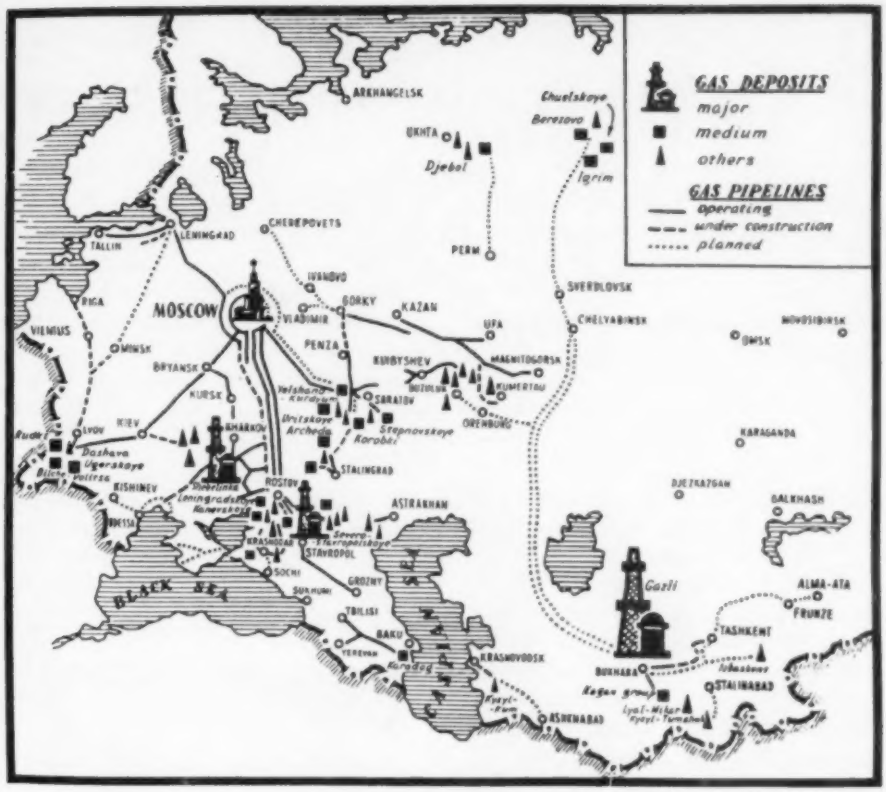
Russia on the other hand has less than 15,000 miles of pipe lines at the present.

But what earthly difference should this make to either the Russians or Americans in the gas business? The important thing is that each should be able to keep abreast of the demands of its market; and should supply that market efficiently. If Russia needs 1 million miles of pipe line to serve its market, it should construct that amount. And if it takes 20 trillion cubic feet of gas per year to supply its market, the Russian gas industry should try to produce that amount. What difference should U.S. volumes and miles of pipe lines make to the Russians?

But according to posters, propaganda and a challenge laid down by Khrushchev in New York in September 1959, Russia will strive to outstrip the U.S. regardless of its needs. For Khrushchev said, ". . . Our Geologists have discovered gas deposits so large that they will suffice for dozens of years. This gives us the chance to increase the output and consumption of gas still more and outstrip you on that point as well!"

Objectives of Russia's Seven-Year Plan. Russia's famed Seven-Year Plan which went into effect in 1958 was discussed in detail in the January issue of PIPE LINE INDUSTRY. However, here is a brief rundown on some of these objectives.





Map shows gas industry of today and as planned for 1965. The two lines at lower right running from the Gazli field to the heavy industrial area east of the Ural Mountains will be 40 inches in diameter. New line running south from Moscow is also 40-inch.

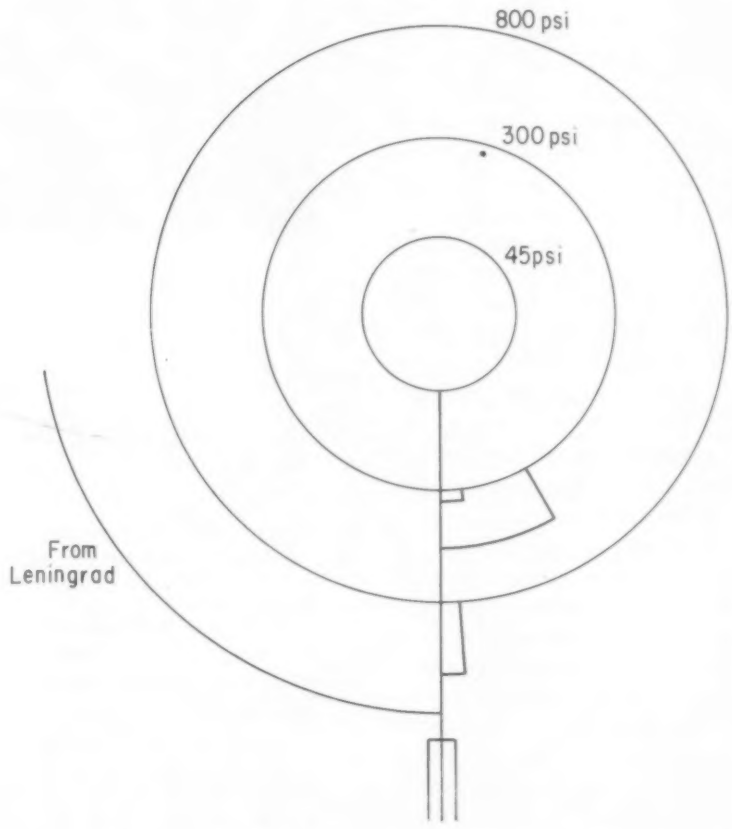
Miles of pipe to be laid during the period (1958 to 1965)—16,100 miles or 2,300 miles per year. Total mileage in 1958 was 17,000 km; by 1965 it is projected to be 40,000 km (or 25,000 miles).

Largest lines to be laid during the period—a 40-inch (1020mm) diameter line will run from Krasnodar and Stavropol to Moscow, and twin 40-inch lines will run 1,500 miles from the Gazli field in the Uzbeck Republic in the southern part of the USSR to the industrial area east of the Ural Mountains. These two parallel lines are scheduled to have 19 compressor stations with a horsepower of 45,000 each.

How Russia's energy picture will change:

Source	Percentage today	Percentage in 1965
Coal	74.4	58.6
Oil	10.2	14.6
Gas	6.2	21.4
LPG and other	9.2	5.4

Growth in total fuel requirements: In terms of metric tons of coal, one of which weighs 2,204 pounds and has about 29,000,000 Btu's, Russia's total energy requirements in 1958 were 487 million tons or 14 trillion Btu's.



Circular concentric loops will distribute gas feeding into Moscow. For incoming lines, see map.

Here's a rundown on Russian pipe line technology . . . patter

In 1965 Russia predicts its energy requirements will be the equivalent of 700 million tons of coal or 20.3 trillion Btu's.

Predicted annual production of natural gas:

1958... 29.8 billion cu. meters or 1.05 trillion cu. ft.
1960... 53.0 billion cu. meters or 1.86 trillion cu. ft.
1965...150.0 billion cu. meters or 5.20 trillion cu. ft.

Russian engineers are hoping to ultimately complete an extensive pipe line grid system across the heavily populated and industrialized zones. The entire system will operate within the same pressure ranges. Particular attention is being given to the fuel requirements in the industrial area being constructed to the east of the Urals. Projected operating pressure for the system is 1,000 psi.

Pipe Line Technology in USSR. Russia has patterned its pipe line system after the U.S.; and quite naturally, its pipe line installations and construction practices are similar to those of the U.S. Here is a brief rundown of the technical observations related by Goodrich on his return from the Russian tour:

Wellhead installations. Russia is just starting to use low-temperature separation units. But such equipment is installed at central points rather than at individual well heads.

Gas measurement. Little attention is given this phase of the industry. Nobody buys and nobody sells.

Gas regulation. Regulator installations are about the same as those in the United States.

Pipe. The largest pipe which can now be manufactured in Russia is 28-inch according to knowledgeable authorities. Russians rate pipe in terms of ultimate strength rather than in terms of yield strength as we do in this country.

Ditching. Trenching machines perhaps cut deeper as a rule. In certain areas, the Russians like to keep the top of the pipe well below the frost line. Subsurface rock is rarely a problem in Russia—nor, for that matter, are fences and right-of-way acquisitions!

Pipe laying methods used on 40-inch pipe. The pipe was triple-jointed with semi-automatic welding machines and hauled to the job where laying operations were very similar to those practiced in the United States.

Welding. No internal line-up clamps were used. The pipe was lined up with external clamps, tack-welded by hand. The hot-pass was made with a bare metal electrode wire under a CO_2 shield. (The gas comes from flux contained in the center of the wire). Semi-automatic welding machines made the last pass. This machine was fairly small and not unlike those used in double-jointing yards in the United States. The pipe was rotated as the weld was made under powdered flux. Excess flux was reclaimed and shoveled back into the hopper above the pipe).

Baxter D. Goodrich is one of the present-day leaders in the U.S. gas industry. He was graduated from Rice University in 1935 with a B.S. degree in civil engineering and joined M. W. Kellogg Company the same year. One year later he joined United Gas Pipe Line Company. In 1943 he was called to active duty with the U.S. Navy and served until 1946 when he was discharged with the rank of lieutenant commander. He was appointed chief engineer with Arctic Contractors, a firm working on petroleum projects on the Arctic coast of Alaska. Later in 1946, he joined Texas Eastern Transmission Corporation as vice president and chief engineer. In this capacity, he has supervised construction projects costing more than a half billion dollars over an 11-year period. He is now senior vice president in charge of Texas Eastern's Gas Division.

Testing welds. Welds are tested for imperfections with a magnetic tape which is held against the pipe while it is exposed to a strong magnetic field. The tape is then played back through an oscilliscope and the discontinuities, slag inclusions, etc., show up.

Pressure testing completed lines. Sections of cross-country lines are tested up to 10 percent above operating pressure with gas. River crossings and sections of line traversing densely populated zones are tested to 25 percent above operating pressure. Russians say they are planning to test with air in the future.

Corrosion protection. The 40-inch pipe was given a coat of asphalt coating. No fiber glass or pipe line felt was used. The final (and only) wrap was of kraft paper.

Corrosion mitigation. Presumably similar to that of the United States.

Compressor station piping. Very little pre-fabricated piping. Mitered joins are common in high-pressure piping.

Compressor buildings. Brick or prestressed concrete.

Compressor engines. The reciprocating engines were similar to the 20-year-old U.S. V-type units in the 1,000 to 1,250-hp range. The Russians claim they have a 2,000-hp unit on test and 4,000 to 5,000-hp units which will be available soon.

Centrifugal prime movers and compressors. Many of the large transmission systems follow electric power lines, so motor-driven centrifugal compressors are common. Russians claim to have developed a means o

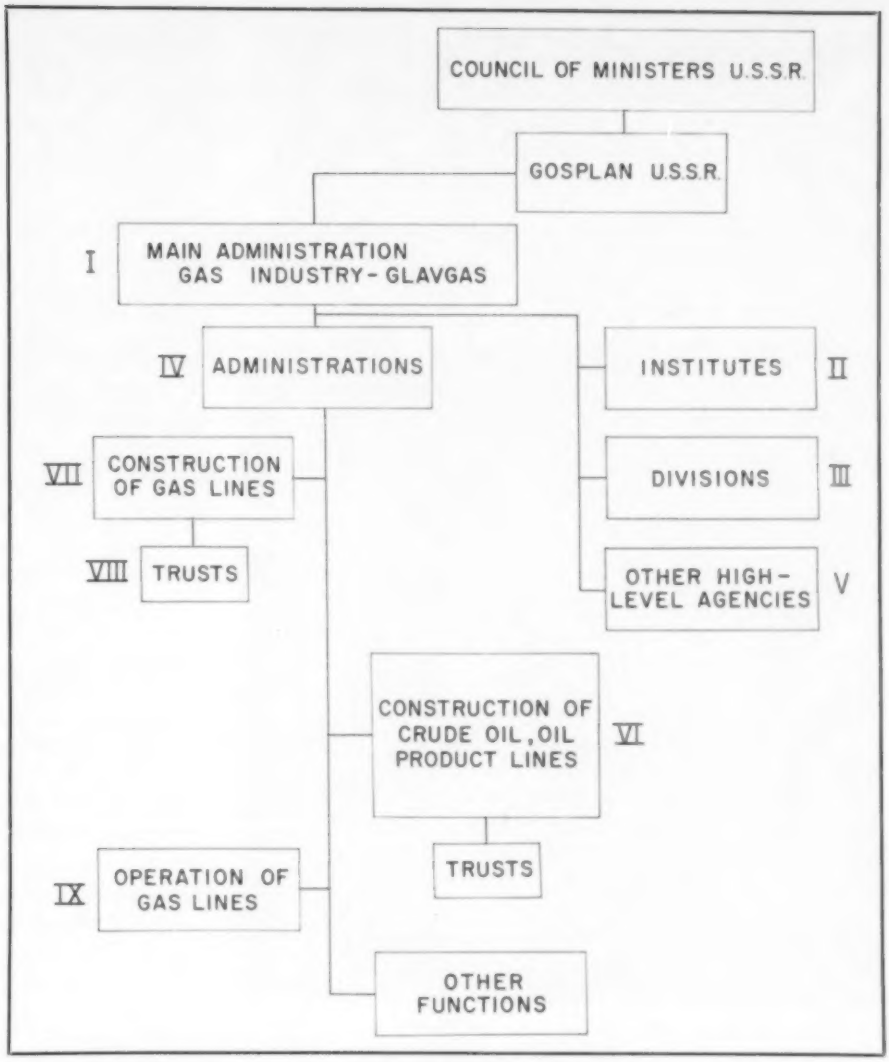
controlling the speed of induction motor drives. Russia has excellent 6,000-hp gas-fired turbines. Russian engineers claim 12,000-hp units are on the way.

Automatic stations. As we know them, Russia has none. They call the remotely controlled stations "automatic." They are now developing telemetering and controls by telemetering. They have some built-in sequentially started prime movers.

Unusual features of construction. About half of the pipeliners on the job which Goodrich and his companions visited were women. Coating gangs were 90 percent women and the boss of the back-end of the spread was a 25-year-old woman. The entire group—both men and women seemed dispirited, however.

What interests the Russians? Most of all they are interested in underground storage—particulary in aquifer storage. One such project is said to be under way near Moscow.

Extensive concentric loops system. Three large diameter concentric loop lines will circle the Moscow area. The outer loop will operate at 800 psi; the middle loop with operate at 300 psi; and the inner loop will operate at 15 to 45 psi. All of the transmission lines coming into the Moscow area will feed into the system of loops, as shown.



ORGANIZATION CHART OF SOVIET GAS INDUSTRY. The Main Administration for Gas Industry (GLAVGAS) is one of the hundreds of similar organizations under the over-all economic planning group—GOSPLAN. The Institutes are comprised of groups of engineers who devote their time and effort to design and planning activities. There are five Institutes connected with the Gas Industry. The one in charge of the twin 40-inch line is comprised of about 1,200 engineers. Pipe lines are constructed by TRUSTS which perform the functions of pipe line contractors.

How Gas Industry Is Organized. The top agency in the USSR is the Council of Ministers. Directly under this group is the Gosplen-USSR. This is the over-all economic planning commission concerned with all phases of Soviet life. The Gas Industry is just one of hundreds of industries regulated by this body.

The main administration for the gas industry is Glavgas. It has direct supervision of administrators who carry out the construction and operation of pipe lines.

Most of the planning is done in the "Institutes" which are usually a pool of engineers and technicians who devote their time to planning and engineering various projects.

The Institute at Leningrad, for instance, has more than 1,200 engineers who are devoting their time to planning and designing the twin 40-inch lines which will run from the Gazli field to the area east of the Urals. There is a similar Institute some 15 miles outside of Moscow; and when facilities are available, this particular organization likely will be turned into a research laboratory for the gas industry. The Institute at Kiev has about 700 engineers.

This lavishment of engineers on projects, created at least a faint twinge of envy among the U.S. executives who visited them.

Pipe line construction is carried out by the "Trusts." These "Trust" are quite similar to contractor-spread units. All of the personnel assigned to a particular trust live together in trailer camps and move along the pipe line as work is completed.

One of the unusual experiences of the group on tour was the night and day spent at Sochi—a resort on the Black sea. This is a recreation center with many beautiful resort hotels—or sanatoriums—belonging to the trade unions. A two-week vacation in one of the sanatoriums is the rich reward for a workman's exceptional work. The only cost to the recipient of this blessing is that he pay a portion of his transportation. As one of the U.S. delegates quipped, "They work like the dickens all their life so they can get a chance to live like a capitalist for two weeks." —**The End**

How to do it

PIPE LINE HINTS

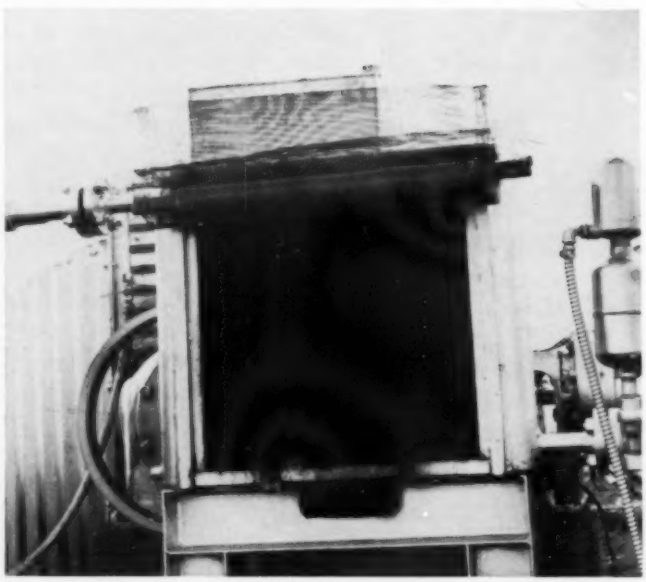
$10 is paid for each illustrated acceptable contribution. Mail to The Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1, Texas

Hydraulic Jack and Frame Make Excellent Press

Make a hydraulic press for your maintenance shop by mounting a heavy duty hydraulic jack in a frame as shown. Weld a heavy steel plate to the bottom of the jack and to it attach the 1¼-inch ram. Run guide-rods through holes on either side of the jack and mount springs on the underside of the plate as shown. Attach the top of the jack to the upper part of the frame. Thus, in operation the jack simply pushes against the top cross-member of the frame pushing downward. A shaft or ram attached to the bottom of the plate completes the hydraulic press.

Note the holes drilled in the sides of the frame. This enables maintenance men to adjust the height of the work in the press.

Screen Wire Cover Moderates Flow of Air Across Cooling Section



Screen wire, or more technically, hardware cloth—either galvanized or aluminum—can be used to moderate the flow of air across an open section atmospheric cooler.

As shown in this illustration, the atmospheric cooler mounted on a field compressor unit has no louvres or other means of controlling the volume of air that passes over the coils. The operator solved this problem by mounting a roll of screen wire and a roll of canvas at the top of the unit. When ambient temperatures are high, he lets the full volume of air flow across the cooling section. When temperatures are in the medium range, he lowers the roll of screen wire and moderates the flow. In cold weather, he unrolls the canvas cover and restricts virtually all air flow.

In this instance, automatic controls to perform this function likely would not pay. The compressor unit is one of three in a battery located at a five-well stripper and compressor installation, and the compressors are visited at least twice per 24 hours by the pumper.

Stock-Pile Top Soil for Wind-Up of Construction Job

More often than not, it is wise to stock-pile the top soil from a station construction site at the beginning of the job; and later use the soil for grading and leveling the station yard and environs.

By bulldozing the top three or four inches of soil to one side of the station yard at the outset, constructors can often gain several advantages: First, there is the esthetic factor. Most pipeliners rate the finished appearance of a station very high in judging the quality of the work on the project. By having a bountiful supply of top soil available for the station yard, the grass, shrubs, etc. can be made to grow quicker and better. Too, drainage contours are somewhat easier to maintain if they are fine-dressed with top soil which encourages the growth of vegetation.

Where needed, this stock pile of dirt can be used for construction of temporary earthen ramps for setting engines, scrubbers, etc.

Extra Needle Valves Can Pay Off

Wherever you have to blow down gas and condensate through a needle valve, you'd better have a spare—or even two spares in the hook up. Here's why. Any throttling through the needle valve will cause wear on the seat and valve stem; and in no time at all, you have a severe leak.

Shown here is one solution to the problem. Install three needle valves right off. The first one is used to shut off flow; the second one is a spare which is normally left open and the third valve is used for throttling —that is opening and closing flow.

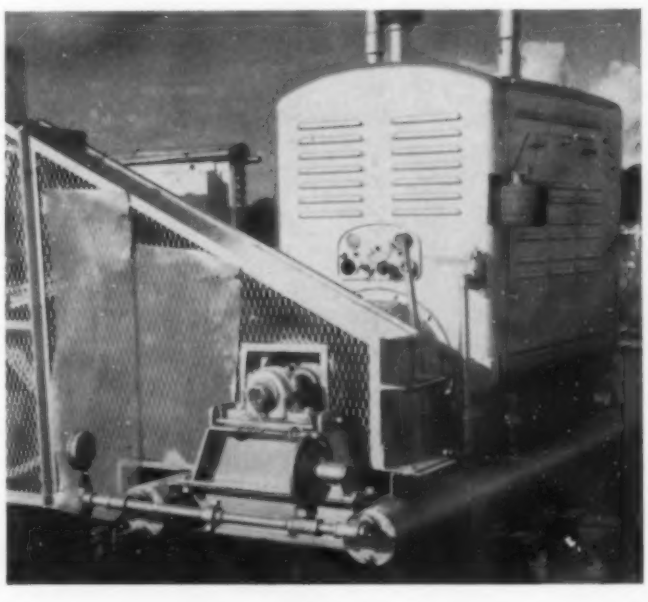
When the operator needs to bleed off the unit, he first opens the inboard valve, then the outboard valve. He reverses this procedure in closing the valves. Because the outboard one throttles the flow as it starts and stops, it will soon develop leaks. It can be replaced by closing the two other valves.

Use Pipe Skids for Fuel Volume Chambers on Compressors

Make the frame-work of a skid-mounted compressor do double duty. By using pipe for the longitudinal skids under the engine, capping the two ends as shown, you can provide the unit with an excellent fuel volume chamber and water knock-out.

Also, it provides a means of reducing the pressure of the high pressure fuel gas in stages, with a volume chamber and knock-out downstream from each regulator.

In this case, two lengths of five-inch pipe were used for runners under the engine. They were connected at either end by I-beams. They were capped, and connections were made for inlet and outlet piping, drains, etc.



Automated Transport

Steel Pipelines

Pipelines are the ideal means of transportation of liquids, gases and slurries. Quick, safe, continuous, without losses, in a straight way, covering any distance.
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WHAT'S HAPPENING IN PIPE LINE CONSTRUCTION

By **Donald G. DePugh,** Construction Editor

Pipe Line Climbs Mountains in British Columbia

Alberta Natural Gas Company's 107-mile, 36-inch section of the Edmonton, Alberta to San Francisco gas line stretches through Rocky Mountains in southern part of British Columbia. Shown here, Mannix Co., Ltd., is working westward from Mt. McGillivray. Mannix is a subcontractor on 20 miles of the ANG section. Price-Poole of Canada, Ltd., has contract on the British Columbia schedule. Weather problems in the Spring and difficult terrain held up progress on this spread. It will be completed this month.

Natural Gas Pipeline Company Lets Contracts on 350 Miles of Gas Lines

Contracts have been awarded to three contractors for construction of Natural Gas Pipeline Company's $52 million expansion project.

R. H. Fulton & Company, Williams Brothers Company, and Panama-Williams Corporation will lay about 350 miles of 30 and 36-inch loop lines in Texas, Arkansas, Missouri, Illinois, Kansas, and Iowa.

Fulton will lay 75 miles of 30-inch in Illinois, 42 miles of 36-inch in Kansas, 21 miles of 36-inch in Iowa and a 36-inch river crossing in Cloud County, Kansas. Williams Brothers will construct 78 miles of 30-inch in two loops in Arkansas. One loop will run from Gum Springs to Nydis and the other from Rowhaten to the Missouri border north of Corning.

Panama-Williams' work includes 25 miles, 30-inch, Hungerford, Texas to El Campo, Texas; 45 miles, 30-inch, Victoria to Refugio, Texas; 33 miles, 30-inch from Marshall southward and 30 miles, 30-inch from Cleveland to Spring, Texas.

Construction will be completed in time to meet increased demands of customer companies in Missouri, Illinois, Indiana, Iowa, and Wisconsin for the 1961-62 winter. Capacity will be increased 160MMcf per day.

Included in the projects will be horsepower additions of 5,800 and supercharging 73 compressor engines.

Transco Granted FPC Temporary Authorization

The Federal Power Commission granted temporary authorization to

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INTERNATIONAL DIVISION • CENTRALIA, MO., U.S.A.

CO61-16

Transcontinental Gas Pipe Line Corporation for construction of $31 million of pipe line facilities.

Transco will construct 187 miles of 36-inch loops in Louisiana, Mississippi, Alabama, Georgia, South Carolina, North Carolina, Virginia and Maryland, and add a 4,000 horsepower compressor station in Louisiana.

The facilities will increase Transco's capacity 97 MMcf of gas per day.

Hunt Oil Company Building Crude System

Hunt Oil Company has let contract to Curran & Company for construction of 36 miles of 3-18-inch crude gathering lines in North Dakota.

Gentry Receives Contract From East Ohio Gas Company

East Ohio Gas Company has awarded a contract to H. L. Gentry Construction Company for 24 miles of 26-inch gas line near Cleveland, Ohio.

Texas Eastman Lets Contract to Burden

Texas Eastman Company has awarded a contract to O. R. Burden Construction Corporation for 117 miles of 6-inch products line from Longview to Trinity, Texas. Texas Eastman plans a line from Longview to Houston.

Missouri Utilities Co. Laying 9-Mile Gas Line

Cape Construction Co., Inc., will lay a 9-mile, 10-inch gas line from near Illmo to Cape Girardeau, Mo., for Missouri Utilities Co.

Central Illinois Lets Gas Pipe Line Contract

Central Illinois Light Company has let contract to Somerville-Illinois Company to lay 6 miles of 12-30-inch gas lines in Peoria County, Ill.

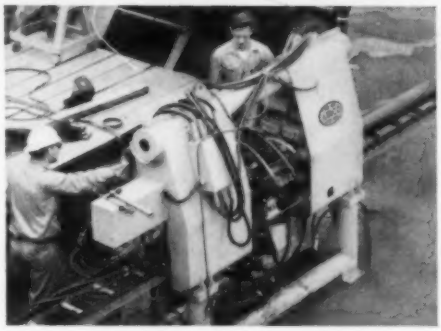
Kuwait Oil Co. Plans 30-Mile Crude Line

Kuwait Oil Company will lay a 30-mile crude line from its Minagish Field in Southern Kuwait to storage tank farms at Ahmadi. The line will consist of 10 miles of 22, 24, and 26-inch. It will operate on gravity flow

Announcing the

NEW AIRCOMATIC® PIPE LINE WELDER

Now . . . production speed brought to pipe line welding . . . in the field in any weather . . . without pipe rotation.



For welding speeds up to 20 times faster than manual rates — the Aircomatic Pipe Line Welder requires only one welding technician, an assistant and a tractor operator, plus the usual line-up crew.

Operation. With square butt-ended pipe in position, the Aircomatic Welder is lowered. Pipe ends are aligned and clamped. Amperage, voltage, welding speed and alignment control are preset. A power grinder slices a narrow channel through one half of the joint from 12 to 6 o'clock. The Aircomatic Welder follows the grinder to perform the weld, in one pass, under a CO_2 shield. No hand steering is needed. Following the first weld, a slot then is cut through the opposite half of the joint, and the second weld completed.

Results. The Aircomatic Pipe Welder can finish a circumferential weld in one minute . . . compared to 20 minutes for a manual weld. Welds are slag-free. Weld strength exceeds that of the pipe.

Soon available on a lease basis are Aircomatic Welders to handle 4, 6, 8, 10, 12, and 14 inch pipe. Larger models will be ready shortly. For further information write Airco today.

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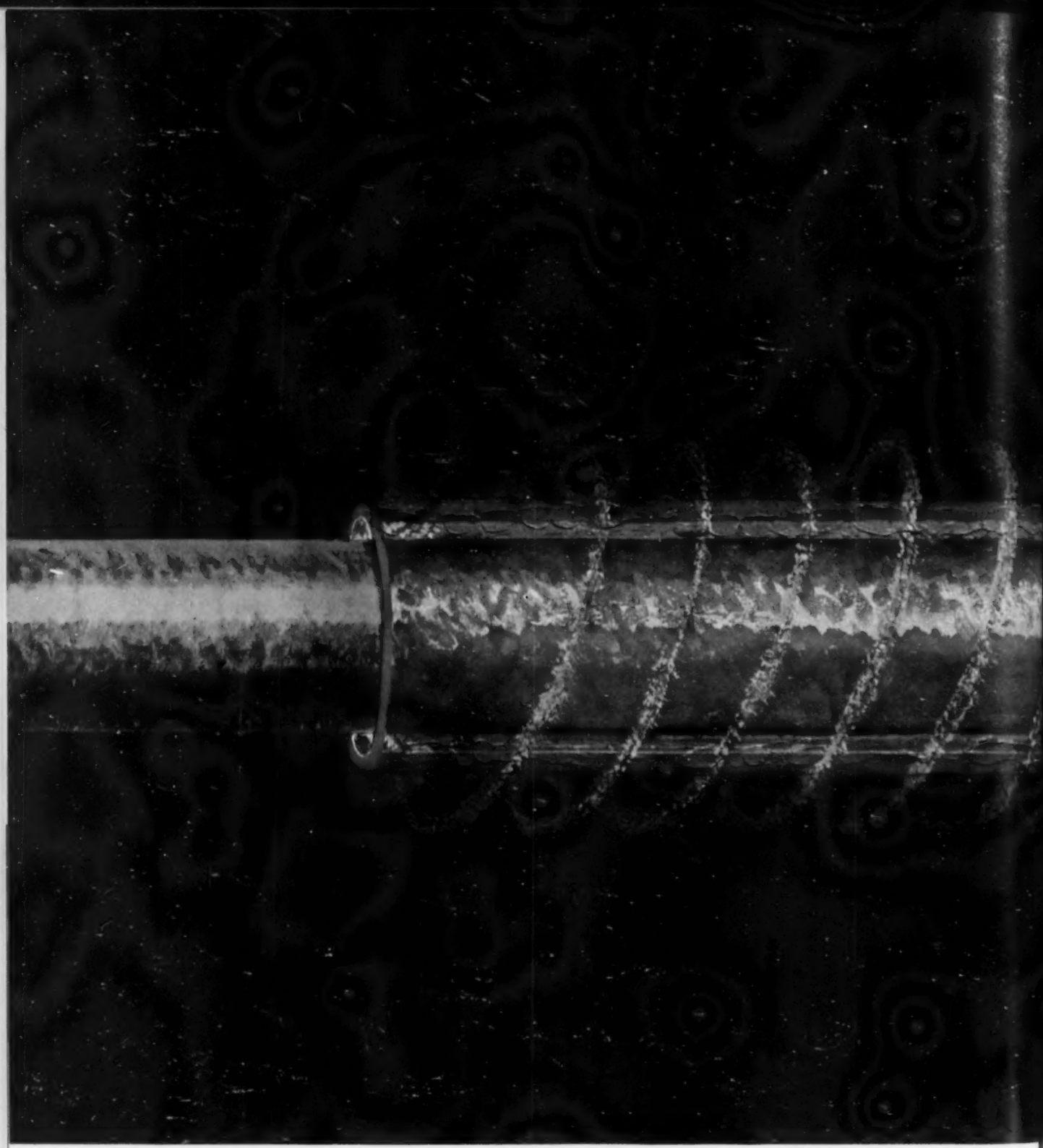
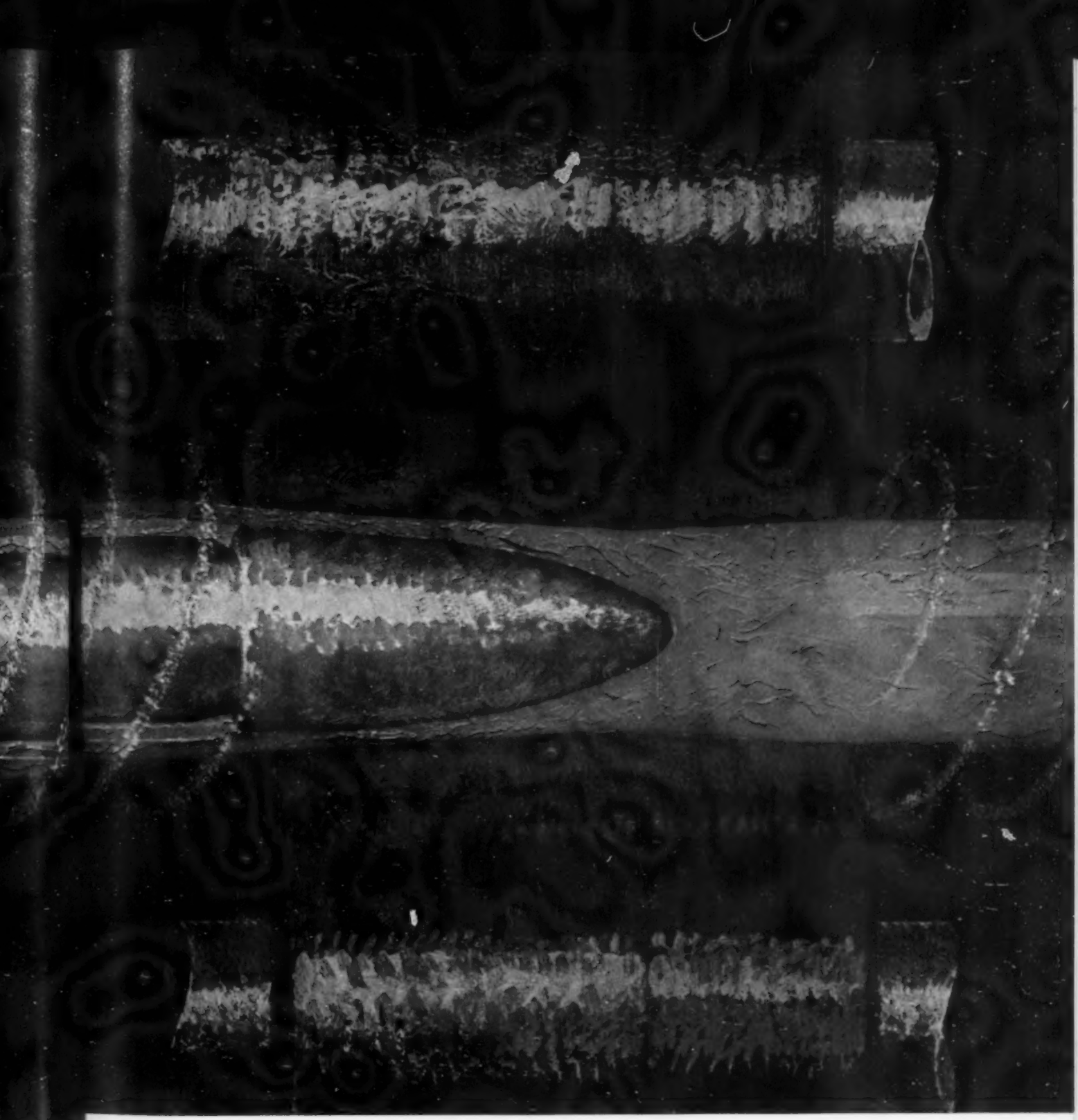


What a tough way to come into the world

This mark tells you a product is made of modern, dependable Steel.



The piercing operation is one of the first steps in creating seamless line pipe from a solid section of steel. After we set the hot steel billet in place, we ram it. Spin it. Push its insides out. And stretch it into a tube many times longer than the original piece of steel.

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PG&E Line Moves Through Lava Beds

Quads drills were used by H. C. Price Company on Pacific Gas and Electric Company's line through northeastern California where lava beds required considerable blasting. Price is nearing completion on the 291-mile, 36-inch line which is the final leg in the Edmonton, Alberta to San Francisco gas line.

with an initial capacity of 100,000 barrels daily. A station may be added to increase capacity later.

Pipe has been ordered and construction is due to start this year with completion set for May, 1962.

Dixie Lets River Crossing Contract

Dixie Pipe Line Company let contract to Pentzien, Inc., for installation of a 12-inch crossing of the Mississippi River near Baton Rouge, La.

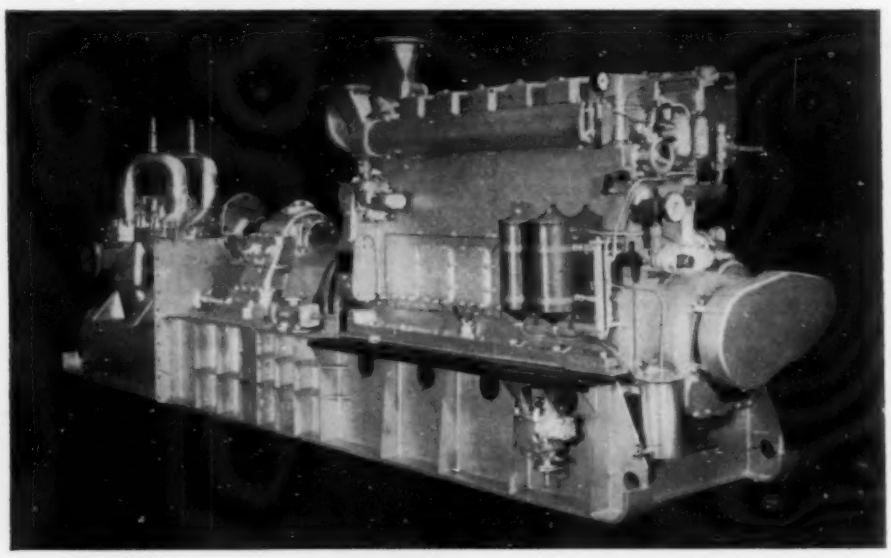
East Tennessee Building 13-Mile, 8-Inch Gas Line

East Tennessee Natural Gas Co., has let a contract to Harbert Construction Corp., for 13 miles of 8-inch gas lines in Hawkins County, Tenn.

West Shore Pipe Line Lets Station Contracts

Midwestern Contractors, Inc., has been awarded contract for construction of four pump stations and one terminal for West Shore Pipe Line Company. Stations will be located at Hammond, Ill., near Blue Island, Ill., southeast of Lemont, Ill., and Romeo station near Lemont. The terminal will be at Des Plaines, Ill.

Poling and Bacon Construction Company, Inc., will build the Jones Island terminal in Milwaukee and St. Martins Junction, near St. Martins,



Explosion-protected Pipe Line Pumping Set consisting of MWM four-stroke Diesel type TRHS 526 S rated for 310 HP at 850 rpm and four-stage KSB Pump type GPL – 1000 with a delivery of 120 m^3/hr (70.5 cu. ft/min) at 526 lbs/in^2 gauge pressure.

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Wis. Contracts for the Granville station, and Green Bay terminal will be let later.

The 285-mile, products line from Chicago to Green Bay will be completed this year.

FPC Authorizes St. Lawrence Project

The Federal Power Commission has authorized the St. Lawrence Gas Company, Inc., to import Canadian gas and build a 75-mile line to import the gas.

The Commission also denied a competing application of New York State Natural Gas Corporation to sell gas to another company for service to this same general area. New York State proposed to sell gas to Niagara Mohawk Power Company, which planned to lay a 122-mile, 12-inch line to deliver the gas. As a result, Niagara's planned line also is denied.

St. Lawrence will lay a 75-mile line from a point on the border near Messena, N.Y. to market areas. The $5.8 million system will have a capacity of 16.7 MMcf of gas daily.

St. Lawrence will receive gas from Niagara Gas Transmission Company Limited and Niagara will be supplied by Trans-Canada Pipe Lines Limited. Niagara Gas Transmission and St. Lawrence are subsidiaries of Consumers' Gas Company, a Canadian Corporation.

The Niagara Mohawk application has been approved twice before by

Fall River Crossing in California

Two sections of concrete coated pipe are welded at Fall River site where a single, 36-inch crossing was installed for Pacific Gas and Electric Company. Construction of the $300 million, 1,400-mile Edmonton-San Francisco system is scheduled for completion in October. Coating system consisted of asphalt-mastic application on the California section.

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CROSE-PERRAULT *Combination*

CLEANING & TAPE WRAPPING MACHINE

The new Crose cleaning and tape wrapping machine offers a new design and improved mechanical cleaning of pipe with twisted wire wheel type brushes revolving at high speed. Self-compensating brushes are long-wearing and economical to replace. Only one head is used, but a counter rotating effect is employed by rotation of the cleaning sprocket and an opposite rotation of wire brushes. Lower fuel consumption, less weight than comparable conventional machines. Can quickly be adjusted from one pipe size to another throughout range of machine. Handles pipe from 3" to 6".

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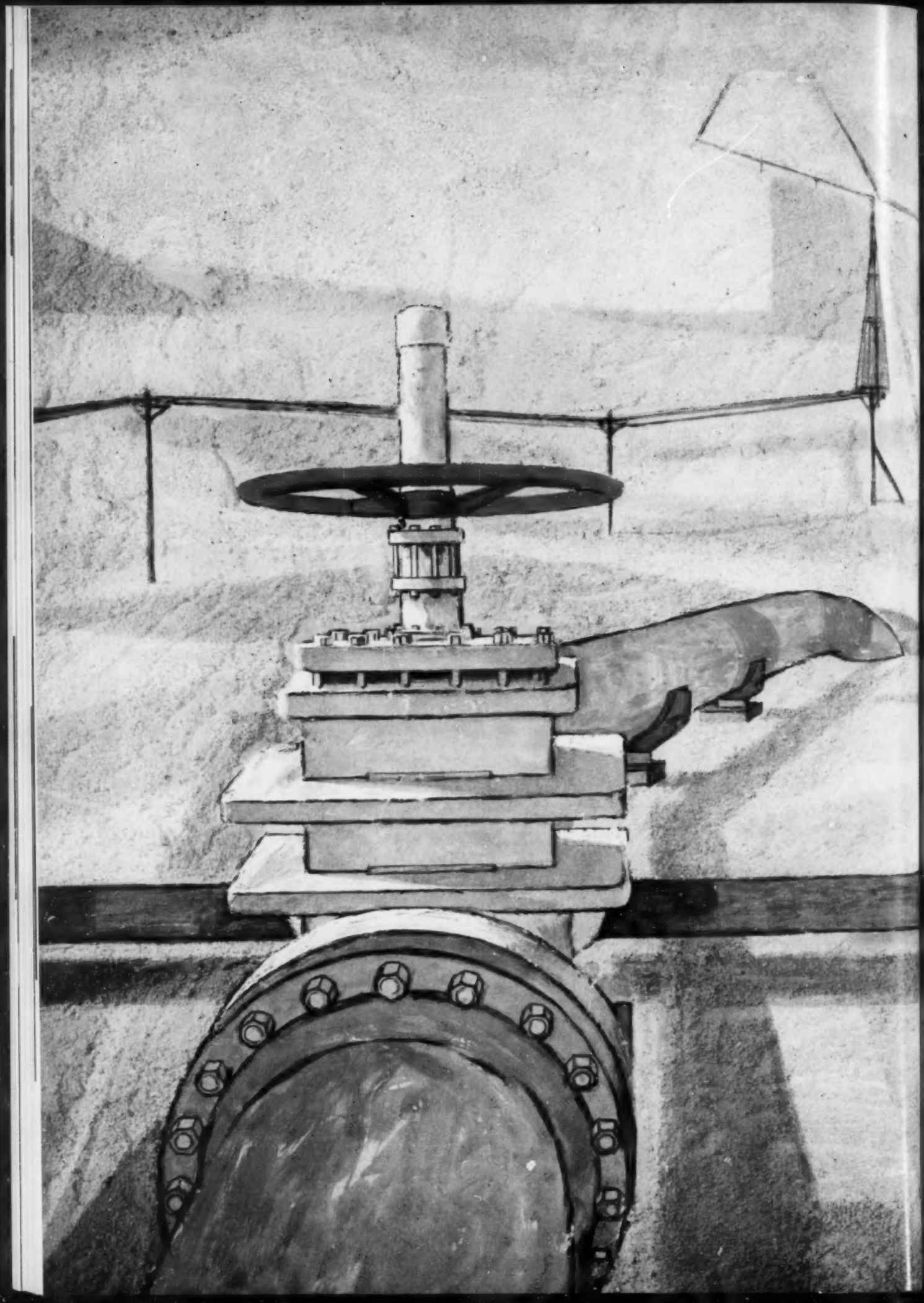

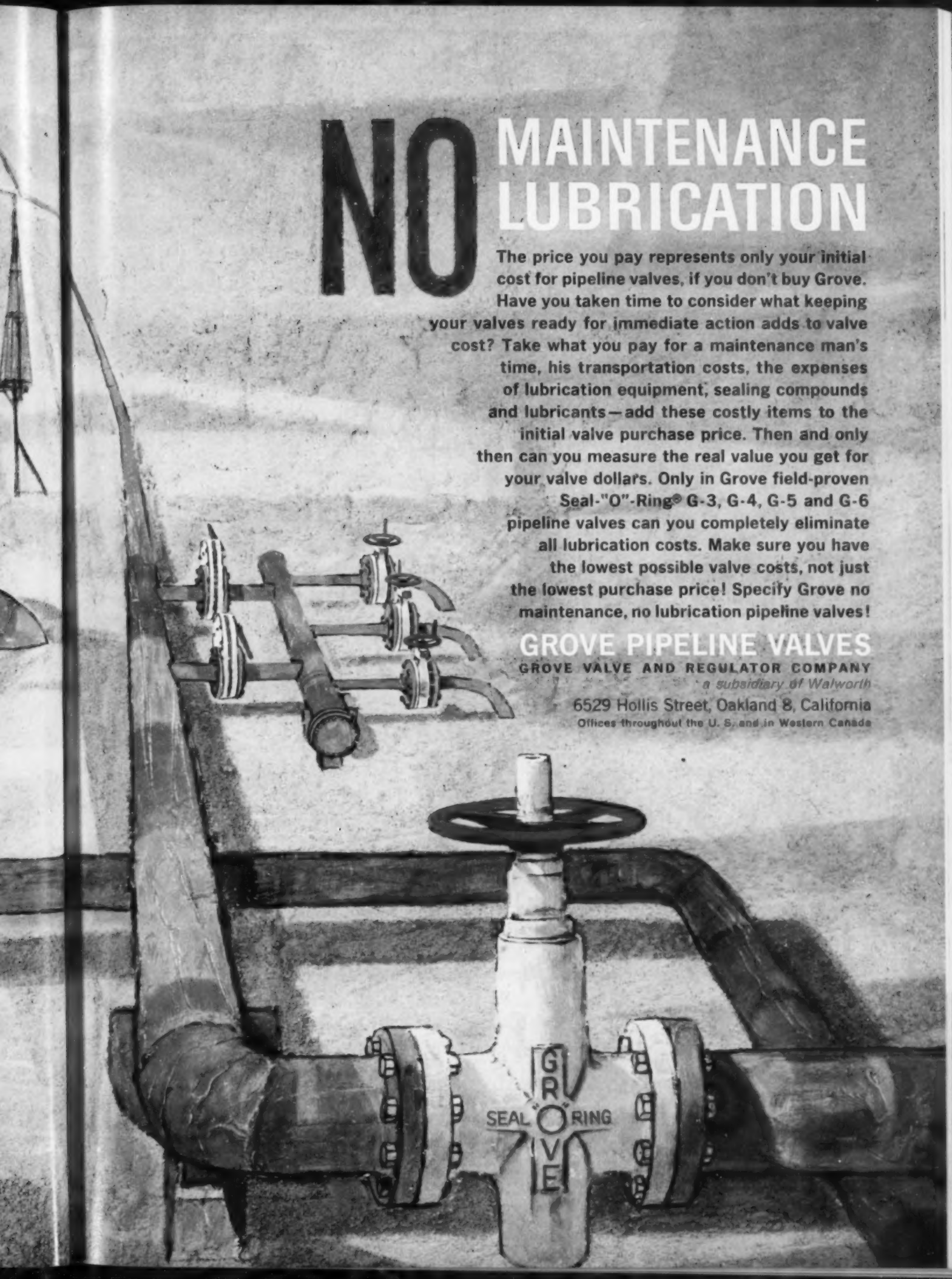
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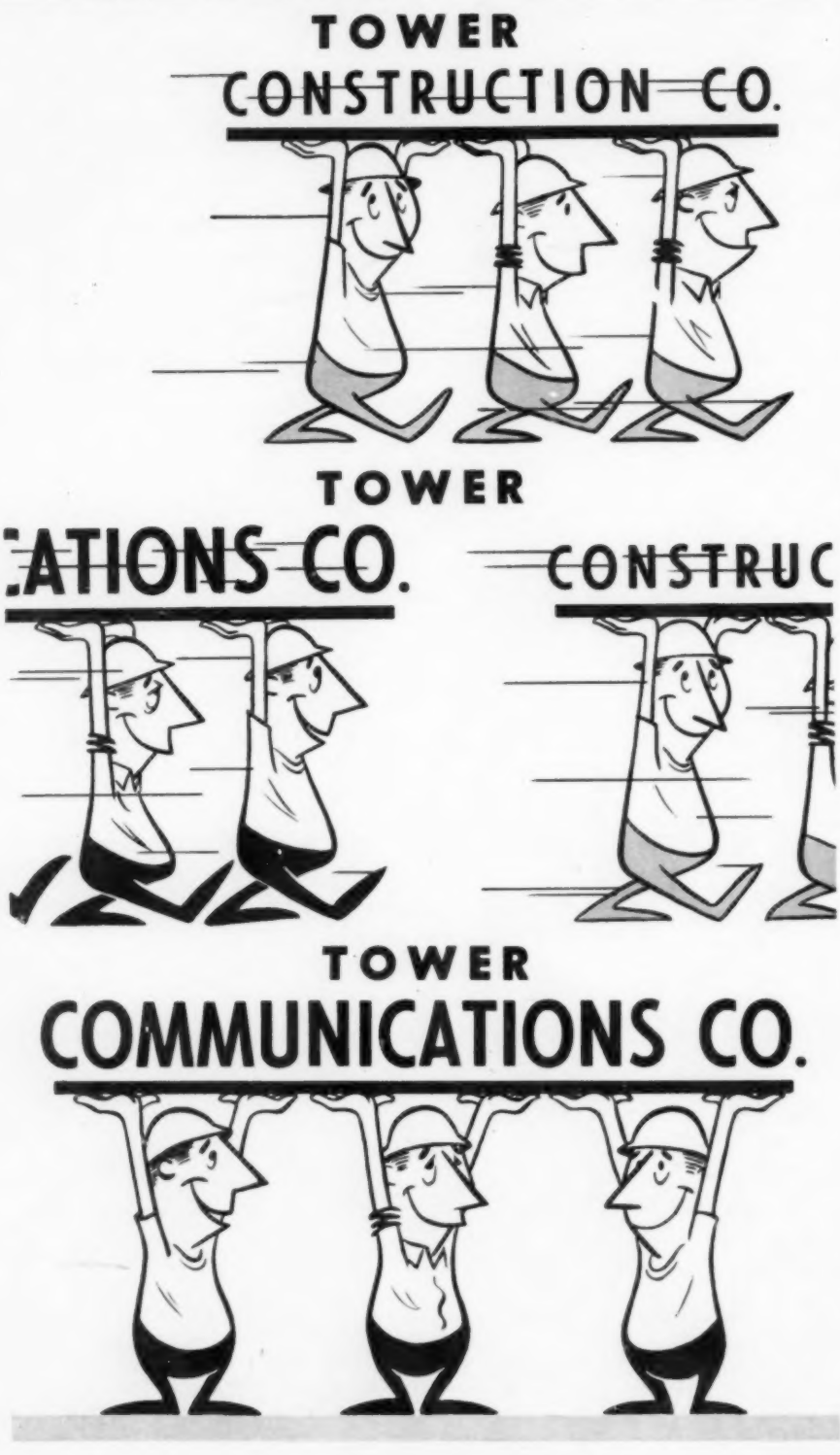

an FPC examiner, but never attained full Commission approval. May 12, the Canadian National Energy Board authorized exportation of the gas and the hearings were reopened.

Texas Gas Awards Construction Contracts

Contracts have been awarded to Houston Contracting Company and Western Pipe Line, Inc., for construction of 146 miles of 8-36-inch lines for Texas Gas Transmission Corporation.

Houston will lay 66 miles of 26 and 30-inch from the vicinity of Memphis, Tenn., to Lafayette, La. Houston also has 50 miles of 8-20-inch from Lake Palourde to Bay Round in Assumption and Terrebonne Parishes, La.

Western Pipe Line will lay 30 miles of 30-inch in Tennessee and Kentucky.

Ohio Fuel Seeks FPC Authorization

Ohio Fuel Gas Company has filed with the FPC seeking permission to increase its capacity. Construction would include about 6 miles of 20-inch line to replace an equal length of 12-inch at a cost of $375,000. The company would also replace 8 miles of 8-inch with 12-inch costing $375,000. Also, Ohio Fuel would replace a 4-mile, 8-inch section with 12-inch pipe.

Service Pipe Line Lets Contract to O. R. Burden

Service Pipe Line Company has awarded a contract to O. R. Burden Construction Corporation for a 60-mile, 8-inch crude line in Wyoming.

The line will extend from Big Piney to Granger, Wyo. and is scheduled for completion by November. The main line will connect pump stations at LaBarge and Granger and will parallel an existing 4-inch line. A gathering system of 12 miles of 4-6-inch also will be laid in the Big Piney area.

Manufacturers Light Receives Approval

Manufacturers Light and Heat Company has received approval from the Federal Power Commission to

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• PROTECTS AGAINST RUST
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Deoxaluminite protects freshly prepared joints from rust and corrosion. Coated by brush or spray after the joints are prepared, parts may be stored or shipped to the job site for welding without further cleaning. High tensile carbon, carbon moly, and chrome moly steels used in high-temperature, high-pressure applications rust or corrode rapidly if not welded promptly...causing poor penetration and low quality welds. Used since 1951 in critical applications up to and including nuclear power boilers.

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construct pipe line facilities amounting to $2.4 million.

Manufacturers will lay a 10-mile, 24-inch line to replace sections of an existing 16-inch line in Allegheny, Washington and Beaver Counties, Pennsylvania and add 4,000 compressor horsepower in an existing station in Marshall County, West Virginia.

Houston Texas Gas & Oil Receives FPC Approval

Houston Texas Gas & Oil Corporation and Coastal Transmission Corporation have been authorized by the Federal Power Commission to expand their facilities at an estimated cost of $23 million.

Houston will construct 235 miles of sales laterals and add 30,000 compressor horsepower at a cost of $16 million. Coastal's program will include 71 miles of supply laterals and 12,500 compressor horsepower costing $7 million. The facilities will increase Coastal's system by 97 MMcf daily and Houston's 93 MMcf per day.

Transco Receives FPC Approval on Offshore Work

Transcontinental Gas Pipe Line Corporation has received Federal Power Commission on offshore construction work costing about $3.5 million. The project includes 17 miles of gas lines connecting Block 23 in South Marsh field with Transco's existing system and adding a compressor station.

Seadrift Pipe Line Co. Constructing Products Line

Seadrift Pipe Line Company has awarded a contract to Fowler-Tatom Construction Co., for a 121 mile, 6-inch products line extending from Kingsville to Brownsville, Texas.

United Gas Awards Contract to Panama, Inc.

United Gas Pipe Line Company has awarded contract to Panama, Inc., for construction of its 60-mile, 36-inch gas line from Bastian Bay field to Lirette in Terrebonne Parish, La.

The $17 million project is scheduled for completion this year.

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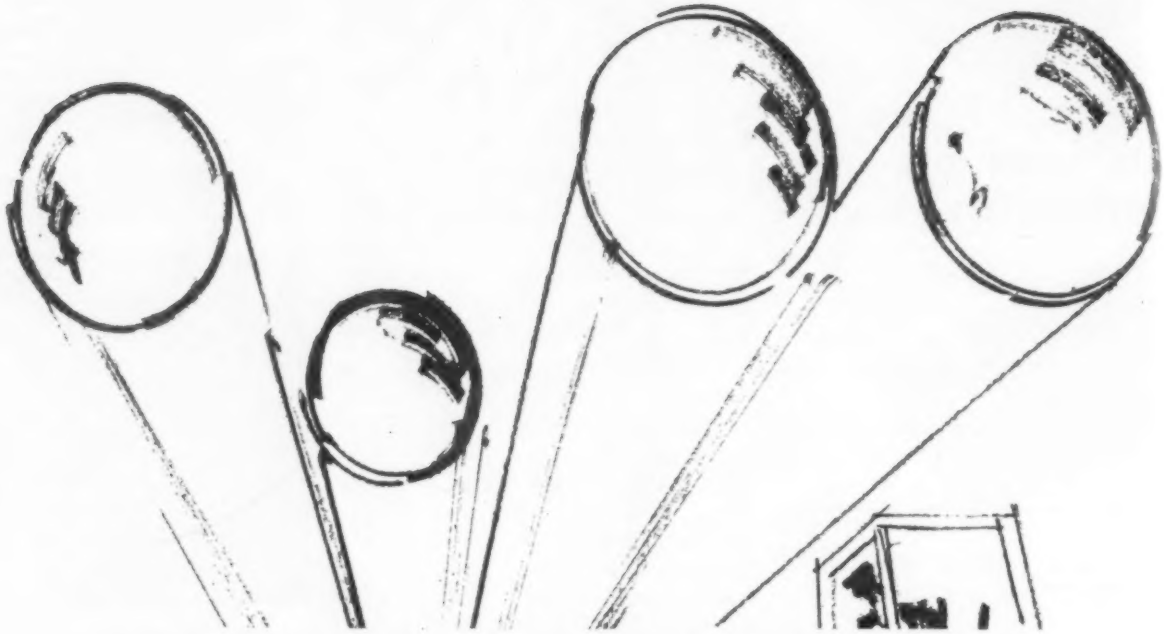

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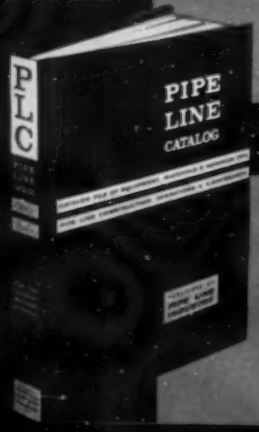

PIPE LINE CATALOG

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PROPOSED PIPE LINE CONSTRUCTION

Here in convenient summary form is Pipe Line Industry's listing of company, line size, length, service, location and project status.

* indicates that this item is a new entry or that status of this project has changed since last appearance.

U.S.

American Petrofina, 133 miles, 6-inch, products, Mount Pleasant, Texas to Grapevine, Texas, $2.5 million, planned.

Algonquin Gas Transmission Co., Boston, 25 miles, 20-inch; 8 miles, 8-inch, gas, and 12,000 hp addition in Massachusetts, $6 million, FPC Authorization.

Ashland Oil & Refining Co., Ashland, Ky., 24 miles, 6-inch, crude, Blaine to Catlettsburg, Ky., planned.

Border Gas Transmission Company, 300 to 400 miles, gas, gathering, in South Texas, $10 million, planned.

California Gas Transmission Company, Los Angeles, (subsidiary of Tennessee Gas Transmission Company), 292 miles, 20-34-inch gas, from Mexico-California border near Mexicali, to Los Angeles and 10,000 hp. to tie into Texas Mexico-California line, $50 million, before FPC and California Public Utilities Commission.

* **Coastal Transmission Corp.,** Houston, 71 miles, 3 to 10-inch, gas, laterals; 5,500 hp in stations at Port Lavaca, Texas and Eunice, La. and 1,500 hp at Robstown, Texas, $7 million, FPC authorization.

Colorado Gas Transmission Co., 250 miles, 20-inch, gas, Southwest Colo., to Colorado Springs, before Colorado PUC.

Colorado Interstate Gas Co., Colorado Springs, 140 miles, 34-inch, gas, Green River, Wyo.,-to-Provo, Utah; 109 miles, 26-inch, Texas Panhandle to southeastern Colorado, 136 miles, 34-inch, southeastern Colorado-to-Pueblo, Colo.; 107 miles, 30-inch, Pueblo-to-Denver, $91 million, FPC conditional authorization.

Colorado Oil & Gas Corp., Denver, 400 miles, gas, from Gubik field to Fairbanks, Alaska, planned.

Columbia Gulf Transmission Company, Houston, 97 miles, 30-inch, loops in Kentucky, Tennessee, Mississippi and Louisiana; 29 miles, 12-inch lateral in Louisiana, $15 million, before FPC.

* **East Ohio Gas Company,** 24 miles, 26-inch, gas, near Cleveland, Ohio, contract let to **H. L. Gentry Construction Co.**

El Paso Gas Supply Company, El Paso, Texas, 228 miles, 30-inch, gas, main, Live Oak to Sutton County, Texas, $30 million, before FPC.

El Paso Natural Gas Company, El Paso, 199 miles, 30-inch, Permian-San Juan crossover loop, before FPC.

34 miles, 20-inch, Puckett to Goldsmith, before FPC.

23 miles, 20-inch, Goldsmith to Eunice-Plains line, before FPC.

9 miles, 20-inch, Goldsmith-Plains loop, before FPC.

43,600 hp in new and existing stations in Texas, Oklahoma, New Mexico and Utah, before FPC.

400 miles, 34-inch, Salt Lake City, Utah, to California border, FPC conditional authorization.

35 miles, 8-inch, gas, to deliver gas to Southern Union Gas Company in Dallas, $1 million, before FPC.

Accuracy . . . in the shop or in the field is the trademark of H & M Pipe Cutting and Beveling Machines. H & M performance is fast, efficient . . . even under the most rugged conditions. H & M's are easy to operate and untrained personnel become experts after just a few minutes' practice with an H & M Machine.

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Equitable Gas Company, Pittsburgh, Pa., 31 miles, 16-inch, and 26 miles, 20-inch, in West Virginia and Pennsylvania, $5 million, before FPC.

Great Northern Pipe Line Co., 64 miles, crude, extension to Lignite field, North Dakota, planned.

* **Houston Texas Gas & Oil Corp.,** St. Petersburg, Fla., 235 miles, 2-6-inch, gas laterals, 30,000 hp in five new stations; $16 million, FPC authorization.

* **Hunt Oil Company,** 36 miles, 3-18-inch, crude, in North Dakota, contract let to **Curran & Company.**

Kansas-Nebraska Natural Gas Company, Hastings, Neb., 165 miles, 2-8-inch, gas, extension from Alliance, Neb., to Chadron, Crawford, Hemingford, Hay Springs, Gordon and Rushville, Neb., before FPC.

45 miles, 2-3-inch, gas, in Kansas, approved by Kansas Corporation Commission.

2,000 hp addition at Scott City, Kan., FPC approval authorization.

2,500 hp addition at Holcomb, Kan., before FPC.

Lone Star Gas Company, Dallas, 47 miles, gathering lines in Palo Pinto, Erath and Stephens counties, Texas, planned.

Lone Star Gathering Company, Dallas, 63 miles, gas, gathering, in DeWitt and Victoria counties, Texas, $2½ million, planned.

Long Island Pipeline Company, New York, 75 miles, 20-inch, products, Linden, N. J., to Long Island, N. Y., $30 million, planned.

Lo-Vaca Gathering Co., (Coastal States Gas Producing Co.) 230 miles, 6-20-inch, gas, gathering, Live Oak to Lavaca County, Texas, planned.

Matador Pipe Line Corp., Denver 175 miles, crude, from Bottineau, Burke and Renville counties, N. D., to Cromer, Man., Canada, $4 million, proposed.

Michigan Wisconsin Pipe Line Company, Detroit, 88 miles, gas, 3,000 hp, take gas from Northern Natural at Janesville, Wis., before FPC.

Mid-American Pipe Line Co., 405 miles, 10-inch, LPG, Superior, Wis., to Chicago, $12 million, considered.

100 miles, LPG, extension from Ogden City, to Charles City, Iowa, planned for 1962.

Monterey Gas Transmission Company, Houston, 216 miles, 30-inch, gas, Clear Lake, Texas, to Alexandria, La., planned.

* **Natural Gas Pipeline Co.,** Chicago, 285 miles, 30-inch; 60 miles, 36-inch, and 22 miles, 8-inch, gas and 64,200 horsepower in Illinois, Texas, Arkansas, Kansas, Nebraska, Iowa, and Missouri, $52 million, contracts let to **R. H. Fulton & Co., Williams Brothers Co.,** and **Panama-Williams Corp.**

New Haven Pipeline, Inc., products line, New Haven, Conn. to Springfield, Mass., $2.5 million, planned.

* **Niagara Mohawk Power Corp.,** 122 miles, 12-inch, Watertown and Massena, N. Y., denied by FPC.

Northern Natural Gas Company, Omaha, 50 miles, gas line, 2,000 hp, before FPC. 99 miles, gas, 4,660 hp, $8.9 million, before FPC.

Northern Gas Products Co., (subsidiary of Northern Natural Gas Co.), 350 miles, 8-inch, LPG, Bushton, Kan., to Des Moines, Iowa, $12 million, planned.

Northwestern Refining Co., crude gathering system, Rival and Lignite fields, North Dakota, $625,000, Public Service Commission approval.

Ohio Fuel Gas Co., 59 miles, gas, 4-24-inch main lines, in Belmont, Carroll, Cuyahoga, Fairfield, Logan, Lorain, Marion, Muskingum, Stark and Wayne counties, Ohio, $5.1 million, planned.

Oklahoma Illinois Gas Pipeline Co., (Fish Engineering and Pan American Petroleum Corp.) 550 miles, gas, Woodward, Okla., to St. Louis, planned.

Pacific Gas & Electric Co., San Francisco, 120 miles, 30-inch gas loops, Topock to Milpitas, before FPC.

Pacific Lighting Gas Supply Co., Los Angeles, 24 miles, 16-inch, gas, Gaviota to Goleta, Calif. $1.7 million, before Public Utilities Commission.

Panhandle Eastern Pipe Line Co., Kansas City, 305 miles, 30-inch, 40 miles, 26-inch, gas, loops, and 43,000 hp, and gathering facilities, $60 million, before FPC.

200 miles, 22-24-inch, gas, lateral, from Elk City, Okla., to Haven, Kan., $15. million, before FPC.

Continued on Page 83

high frequency, resistance welded

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The API monogram on Valley lightwall pipe means highest quality, because Valley pipe meets the standards of the American Petroleum Institute.

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Guards piping economically against rock damage... eliminates expensive dirt padding. Can be applied either in two pieces or by the cigarette wrap method. ½" or ¾" steel strapping with aluminum seals or use of scotch filament tapes insures permanent placement. Ruberoid Rock Shield comes up to 60" wide. Is designed for speedy installation. Lighter weight cuts freight cost.

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PROPOSED CONSTRUCTION

continued

Olympic Pipe Line Co., 324 miles, 6-16-inch, products, Ferndale, Wash. to Portland, Oregon, $17.5 million, planned.

Pennsylvania Railroad, products pipe lines along railroad's right of way to serve Friendship Airport in Baltimore and Washington's National Airport, Andrews Air Force Base, and Dulles International Airport, considered.

Phillips Pipe Line Co., Bartlesville, Okla., 75 miles, main line, 85 miles, gathering crude, from Camrick field, Gray, Okla., to Phillips, Texas, planned.

* **Service Pipe Line Company,** Tulsa, 72 miles, 4-6-8-inch, crude, Big Piney to Granger, Wyo., contract let to **O. R. Burden Construction Corp.**

Southern California and Southern Counties Gas Cos., Los Angeles, 93 miles, 34-inch, California-Nevada border to Newberry, Calif.

St. Lawrence Gas Company, Inc., Ogdensburg, N. Y., 75 miles, gas, main, United States-Canadian border to Ogdensburg, N. Y., $3.4 million, FPC approval.

Suwanee Pipe Line Co., (Sinclair Oil Corp.) Atlanta, 800 miles, 22-inch, products, Baton Rouge to Greensboro, N. C., planned.

Tennessee California Gas Transmission Company, (subsidiary of Tennessee Gas Transmission Co.), 100 miles, 26-inch, gas, gas fields in South Texas to Texas-Mexico border near Reynosa, before FPC.

Tennessee Gas Pipeline Co., Houston 167 miles, 30 and 36-inch loops in Ohio and Pennsylvania, and 36,800 hp in 4 new and 3 existing stations, $38 million, before FPC.

18,300 hp in 3 new stations, $6 million, before FPC.

50 miles, 26-inch loop in Kentucky, FPC authorization.

21 miles, 16-inch, 2 miles, 12-inch, gas, offshore Louisiana, Vermilion blocks 46 and 64, $2.3 million, before FPC.

84 miles, 10-20-inch, gas, offshore Louisiana, FPC authorization.

Texas Eastern Transmission Corp., Shreveport, La.

66 miles, 30-inch, gas, loops, between Vidor, Texas, and Lambertville, N. J., and 33,710 hp in four existing stations, $17.5 million, temporary FPC authorization.

144 miles, gas, 46,300 hp. $27.8 million, for 1962, before FPC.

* **Texas Eastman Company,** Longview, Texas, 280 miles, 6-inch, products, Houston to Longview, contract let on 117 miles to **O. R. Burden Construction Corp.**

* **Texas Gas Transmission Corp.,** Owensboro, Ky., 96 miles, 26-30-inch, gas loops, Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and Indiana; 50 miles, 8-inch and 16-inch extension into Terrebonne, La. producing area, $16.8 million, FPC temporary authorization, contract let to **Western Pipe Line, Inc.** and **Houston Contracting Company.**

* **Transcontinental Gas Pipe Line Corporation, Houston.**

187 miles, 36-inch, loops, in Louisiana, Mississippi, Alabama, South Carolina, North Carolina, Georgia, Virginia, and Maryland, and a 4,000 hp station in Louisiana, $31 million, temporary FPC authorization.

13 miles, 24-inch and 18 miles, 20-inch loops, Louisiana, FPC authorization. 14 miles, 16-inch laterals, 1-mile, 12-inch lateral, Louisiana, $2.1 million, FPC authorization.

29 miles, 20-inch, gas, and 2,500 hp, in South Texas to take gas from South Texas Natural Gas Gathering Co., $2.4 million, FPC authorization.

Trans-Southern Pipeline Corp., Houston, 1,080 miles, 12-inch, LPG, from Mont Belvieu, Texas, to Danville, Va., and 215-mile spur line from Atlanta to Georgia-Florida border, $63 million, planned.

Trunkline Gas Company, Houston, 97 miles, 30-inch, loops, between Longville, La., and Tuscola, Ill., 27 miles, supply laterals, and two 6,000 horsepower compressor stations, before FPC.

74 miles, 26-inch, gas, Longville to Cow Island, La., 24 miles, 18-inch, Cow

Continued on Page 84

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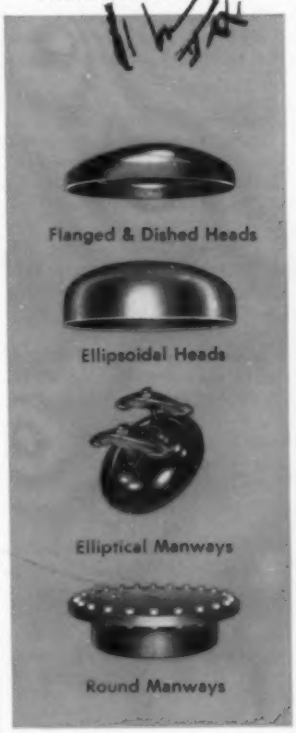

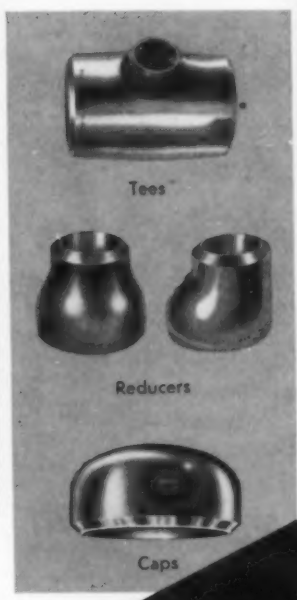

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PROPOSED CONSTRUCTION

continued

Island to Gulf shore, and 24,000 horsepower, $18 million contract to **Panama, Inc.**, and **Sharman, Allen, Gay & Taylor.**

* **United Gas Pipe Line Co.**, Shreveport, La., 59 miles, 36-inch, gas, lateral, between Bastian Bay and Plaquemines Parish, La., $17 million contract awarded to **Panama, Inc.**

217 miles, 30-inch, gas, Lafayette to Monroe, La., $32 million, contracts let to **Panama, Inc.**, and **Stanley-Bledsoe Corp.**

Utah Gas Pipeline Corp., 200 miles, gas, San Arroya and Bryson Canyon fields to Salt Lake City, $15 million, planned.

Valley Gas Transmission, Inc., Houston, 55 miles, 3 to 8-inch, gas, gathering, in Hidalgo, Brooks, Starr and Jim Wells counties, Texas, $15 million, before FPC.

International

ACT Oils, Ltd., Montreal, 400 miles, crude, Dawson Creek, B. C., to Bella Coola, B. C., before B. C. Government.

Ajax Alberta Pipeline Ltd., 28 miles, 10-inch, gas, main, Morinville to Westlock, Alta., planned.

Assistencia de Oleodutos du Petrobras, Rio de Janeiro, 280 miles, 12-inch, crude, Rio de Janeiro to Belo Horizonte, Brazil, planned.

Alberta Gas Products System, Ltd., 725 miles, 8-12 inch, gas liquid gathering system, to connect with Trans Mountain system for delivery to U.S. border, before Alberta Conservation Board.

Bituminous Oil Pipeline Co., Calgary, 250 miles, crude, from Athabasca tar sand plant in northeastern Alberta to Edmonton, approved.

Britamoil Pipe Line Co. Ltd., 64 miles, 8-inch, gas-liquids, Rimbey to Edmonton, Alberta, $2 million, authorized.

British American Oil Co., Ltd., Toronto, 125 miles, gas, Pincher Creek fields to Calgary, Alta., before Alberta Public Utilities Board.

British Columbia Oil Transmission Co., 75 miles, crude, Blueberry field to Taylor, B.C., $8 million, planned.

Burmah Oil Co., Ltd., 850 miles, crude, 20 inch, from Nahorkatiya to Calcutta, India. Contract let on 250 miles to Mannesmann-Saipem.

Cartier Gas Corp. (St. Maurice Gas, Inc., and Consumers Gas Co., Toronto), 170 miles, gas, Montreal to Quebec City, planned.

Consolidated Gathering Systems, Ltd., Calgary, 198 miles, crude, Sturgeon field to Edmonton, planned.

Esso Argentina, 14-inch, crude, Neuquen to Bahia Blanca, contract let to **Techint, Inc.**

Continued on Page 88

FLEET-LINE WELDING FITTINGS

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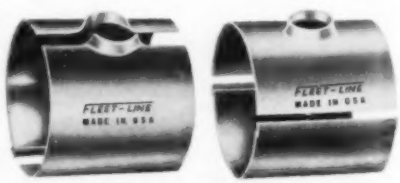

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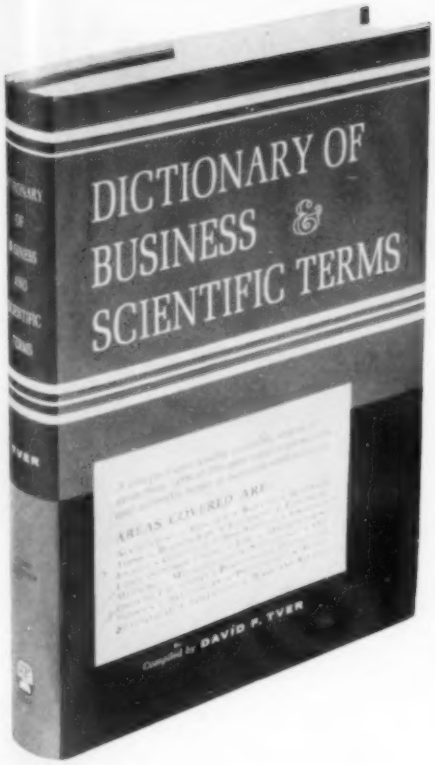

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fter 4-inch flood
aylor *pipeline job*

Note that the long boom permits pulling in the clay spoil bank first—then casting board farther to bring in top black soil "spoil," for topping out the ditch. High boom clearance allows in-haul cable to come in above tracks—no dragging through mud means longer cable life. Job: Sharman, Allen, Gay and Taylor, laying 56-mile section of dual line, Seadrift to Texas City.

This 150-B Backfiller beats "hip-boot" conditions to get the spread going after a flood. Even in "soupy" going, precision-lapped, metal-to-metal full floating seals prevent grit and water from "doing dirt" to the 1,000-hr. lube-interval Dura-Rollers.

A four-inch downpour flooded the old ricefields which this line crosses. Before the lowering-in of pipe could be resumed, the contractor had to pump out the ditch.

To control water for the pump-out crew, this new International Superior 150-B Bucket Backfiller forms water "checks" in the ditch at regular intervals—with a few boards-full of spoil dirt.

Balance helps this new backfiller "plow" across swamp and backfill ditch for Sharman, Allen, Gay, and Taylor. Mounting the draw-works on the right-hand side counter-balances the boom—prevents miring down or tipping.

Flotation traction and clearance help the 150-B keep "navigating"—even in extreme bog conditions. There's 98⅜ inches of track length on the ground, 24 inches of width if needed—for flotation and grouser grip.

Your operator pivots the seat to face the ditch when yo-yoing—or look ahead, traveling. His feet steer this backfiller with hydraulic power—his hands are free to keep yo-yoing. Twelve speeds forward or reverse, from 28-feet per minute up to regular tractor speeds, save time, add capacity. This is the only tractor-mounted, one-man-operated backfiller on the market!

And your operator has no "hot clutch time-outs"—cone clutches are eliminated! New positive clutches run in oil. No excessive heat even in steady, heavy backfilling!

See the new International Superior 150-B Bucket Backfiller on the job. Compare boom reach—size-up dirt-into-ditch capacity with 16 to 20 passes a minute. Measure operating and upkeep ease—maintenance economy. Prove that the 150-B gives you an unequalled combination of features to beat pipelining conditions as they come. Let your International Superior Distributor demonstrate.

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PROPOSED CONSTRUCTION

continued

Empresa Nacional Calvo Sotelo, Madrid, Spain, 150 miles, 14-inch, crude, main line, Malaga to Puertollano, Spain, $10 million, planned.

Gas del Estado, Buenos Aires, 1,050 miles, 30-inch, gas, Comodoro Rivadavia field to Buenos Aires, $380 million, bids submitted for design and construction by Texas Eastern Transmission Corp., ENI, and an Argentine firm.

Gas Trunk Line of British Columbia, Vancouver, 250 miles, 30-inch, gas, main, Fort Nelson to Taylor, B. C., planned.

Gasversorgung Sueddeutschland, 180 miles, gas, Mannheim to Karlsruhe to Kehl and Ulm, $20 million, planned.

Hudson's Bay Oil & Gas Co. Ltd., Calgary, 41 miles, 4-8-inch, condensate, Waterton-Castle River area and Pincher Creek field to Carway to connect with Glacier system, authorized.

Hughenden Pipeline, 125 miles, products, Dick Lake gasoline plant to Hughenden Region, Alta., planned.

Independent Pipe Line Co., 2,019 miles, 34-36-inch, crude, Edmonton to Montreal, 23,000 pump horsepower, $395 million, before Borden Commission.

International Gas Co., Los Angeles, 1,800-miles, 30-inch, gas, Reynosa to Mexicali at California border, considered.

Interprovincial Pipe Line Company, 350-mile extension from Toronto to Montreal, looping line from Edmonton to Toronto, crude, $240 million, considered, products pipe line, Superior, Wis., to Chicago, considered.

90-mile, crude, Hamilton, Ont., to Buffalo, N. Y., before National Energy Board of Canada.

* **Kuwait Oil Co.,** 30 miles, 22, 24, 26-inch, crude, Minagish field to Ahmadi, planned.

Mid-Continent Pipe Lines, Ltd., 1500-mile, 30-inch crude, Edmonton to Chicago, planned.

Naphtha Israel Oil Co., 75 miles, 6-inch, gas, Rosh-Zohar field to Ashdod Yam on Mediterranean planned.

National Iranian Oil Co., 146 miles, 6 inch, crude, from Azna to Isfahan, Iran, $5 million, planned.

Northern Alberta Pipe Lines, Ltd., Edmonton, Alta., 110 miles, 10-inch, gas, main, Lac La Biche to Edmonton, $3 million, planned.

Northern Pipe Line Company, 153 miles, 16-inch, crude, from Regina, Saskatchewan, to Clearbrook, Minn., $10 million, planned.

Rhein-Donau Oletung, G.m.b.H, 185 miles, 24-inch, crude, Karlsruhe to Ingolstadt, $7.5 million, planned.

Peace River Oil Pipe Line Co., Ltd., 161 miles, 12-inch, crude, main line, Fox Creek to Edmonton, Alberta, planned.

Petroleos Mexicanos, 4, 6 and 8-inch, products, Mexico City-Puebla to Cuernavaca, planned.

1,240 miles, 34-inch, gas, Reynosa to Mexicali, Mexico, $160 million, negotiating with Tennessee Gas Pipeline Company for design and construction of the line.

360 mile, 12-inch, products, Minatitlan to Puebla and Mexico City, planned.

Products, Guadalajara to Tepic, planned.

Products, Aguascalientes to Zacatecas, planned.

6-inch, products, Guaymas to Ciudad Obregon, considered.

8-inch products, Guaymas to Hermosillo, considered.

Gas, Ciudad Carmen to Ciudad Pemex.

8-inch, crude Comalcalco to Minatitlan.

Crude, Minatitlan to Salina Cruz, contingent on proposed refinery on Pacific Coast.

149 miles, 10-inch, products, Ciudad Pemex to Minatitlan, planned.

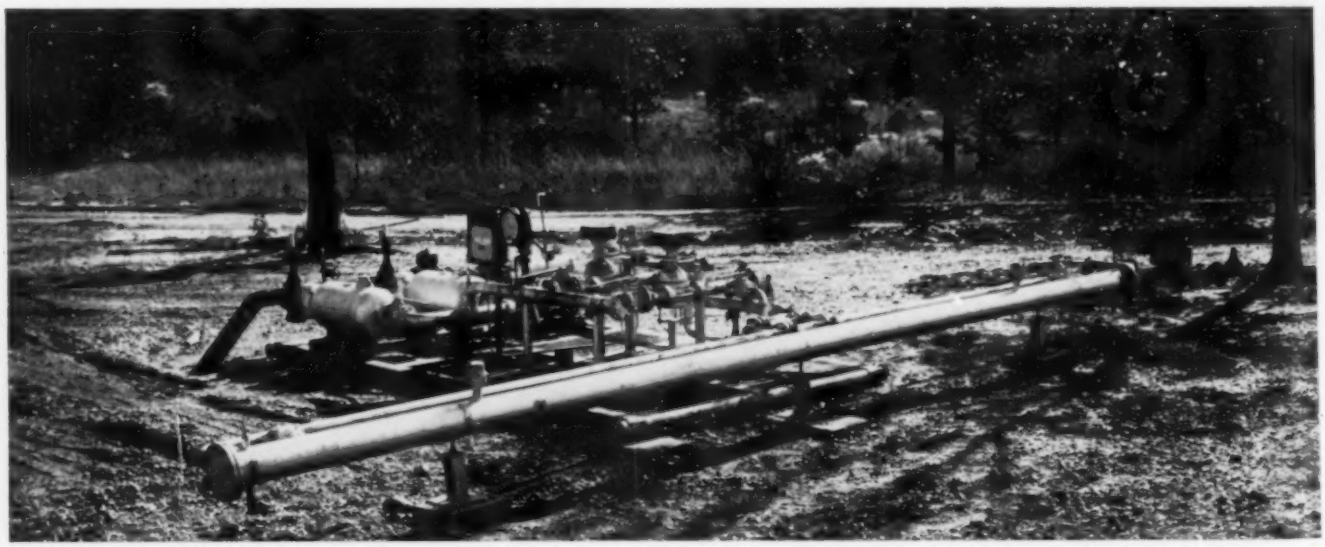
181 miles, 4-inch, products, Mexico City to Salamanca, planned.

Pipelines of Puerto Rico, Inc., 95 miles, 8-inch, products, Penuelas to San Juan, Puerto Rico, approved.

Quebec Gas Transmission Lines, Inc., Montreal, 300 miles, gas, main, Quebec to Montreal, planned.

Rangeland Pipe Line Company Limited, 111 miles, 8-inch, crude, southeastern Alberta to Calgary, $3 million, planned.

Continued on Page 90



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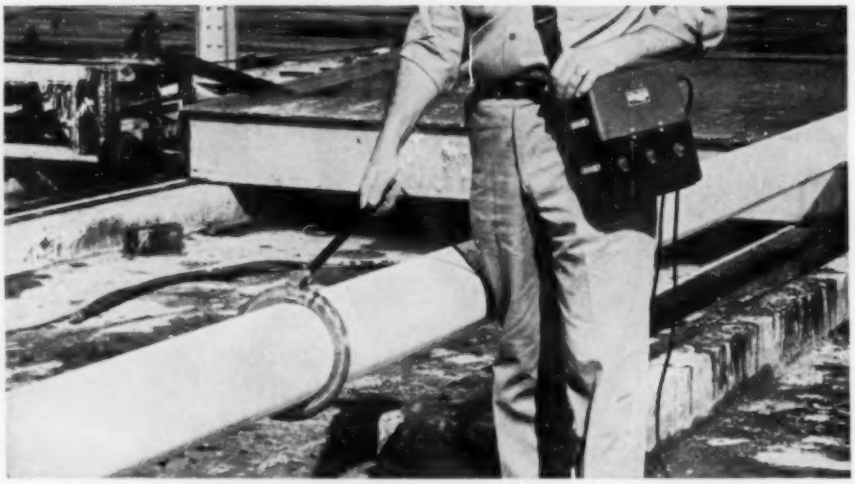

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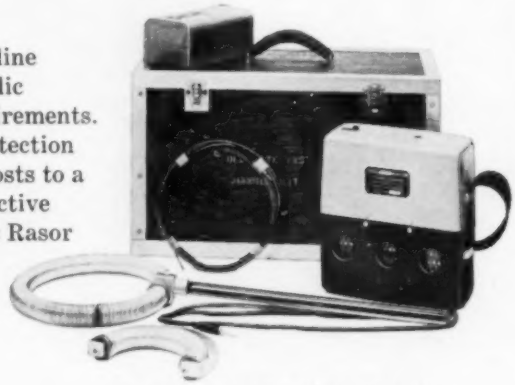

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PROPOSED CONSTRUCTION

continued

Royalite Oil Co. Ltd., 26 miles 4-inch, products, in Alberta, authorized.

Saskatchewan Power Corp., 179 miles, 4-6-8-inch, gas, planned.

Societa Nazionale Metanodotti, 650 miles, 18-inch, crude, Genoa to Milan-Cremona-Torino, Italy, and Aigle, Switzerland, with extension to Karlsruhe and Munich, Germany, contract let on Italian portion to **Saipem.**

Societe du Pipe Line Sud-European, Paris, 432 miles, 34-inch, crude, port of Lavera to Strasbourg, with lateral extending 40 miles to Karlsruhe, Germany, approved by French cabinet.

Soc. Siciliana Metanadotti, gas line from Hassi R'Mel field in Algeria through Tunisia, across Mediterranean to Sicily and into Italy, considered.

Soc. Trapil, 200 miles, 12-inch, crude, La Havre to Paris, France, planned.

Standard-Vacuum Oil Company, 60 miles, 8-inch, gas, main, in South Sumatra, considered.

Ste. d-Etudes de Pipeline Intercontinetaux, Paris, 1,400 miles, 30-40-inch, gas, from Hassi R'Mel field in central Algeria across Mediterranean, through Spain, France and into West Germany, considered, Fish International Corporation making engineering and feasibility studies.

Sui Gas Transmission Co., Multan, Punjab, India, 145 miles, 8-inch, gas, from Sylhet to Dacca, East Pakistan, $9 million, considered.

130 miles, 16-inch, gas, main line, Multan to Lyallpur, planned.

Syrian Pipeline, Damascus, 500 miles, crude, from Karshuk field, Syria, to Mediterranean, planned.

300 miles, products, from Homs to tank farms in Damascus, Aleppo and Latakia, planned.

Trinidad and Tabago Electricity Commission, Trinidad, 42 miles, 16-inch, gas Penel field to Port-of-Spain, planned.

Trunk Pipelines Ltd., London, 70 miles, products, Canvey Island to Denham, Buckinghamshire, bill before Parliament. Extension of line from Denham to Birmingham, planned.

Yacimientos Petroleos Fiscales Argentina, Buenos Aires, crude line between Mendoza and Buenos Aires, considered.

Coastal States Awards Contract on Gas Line

Coastal States Gas Producing Company has awarded a contract to Sharman, Allen, Gay & Taylor, Inc., for construction of a 125-mile 22-24-inch gas line to serve San Antonio, Texas.

What's Happening

among MEN in the INDUSTRY

Humble Pipe Line Comany and **Interstate Oil Pipe Line Company** have completed their merger and are a wholly owned affiliate of **Humble Oil and Refining Company.** The new firm retains the name Humble Pipe Line Company and established offices in Houston at the Melrose Building.

Board of directors of the new company include **P. H. Hunter, W. S. Spangler, W. F. Davis, S. Brown** and **C. E. Shaver.** Officers are Hunter, president, Spangler, executive vice president, Davis, vice president-operations, Brown, vice president-financial, Shaver, general counsel, **E. L. Krueger,** treasurer, **F. R. Clark, Jr.,** secretary and assistant treasurer, **J. D. Sturtevant,** controller, **J. McGarrie,** assistant secretary and assistant treasurer, **H. C. Bloomfield,** assistant controller, **C. P. Endress,** assistant treasurer.

Hunter had been president of Interstate since 1955 and in 1961 he was named president and director of **West Shore Pipe Line Company.** Spangler was elected president of Humble Pipe Line in 1961 and has been with Humble since 1933. Davis had been with Interstate and was a director, vice president, and general manager and in 1956 became a director of **Yellowstone Pipe Line Company.** Brown had been vice president-staff with Interstate and has been in the organization since 1936. Shaver joined Humble in 1937 and became a director in 1955.

Kenneth H. Bowman, former engineer at Galesburg, Ill., has been transferred to Casper, Wyo., and **V. V. Miller,** station foreman at Hankamer, Texas, has been moved to Center, Mo., for **Service Pipe Line Company.**

Bowman replaces **Herschel Evans** who was promoted to division schedule coordinator for the Wyoming division. Miller has been with the company since 1929.

Service Pipe Line Company has been awarded 22 safety awards including nine API accident prevention awards and 13 Joseph A. Holmes certificates. The Holmes honor is the government's highest award in recognition of industrial safety and is presented by the Bureau of Mines in honor of its first director. Several Service districts receives honors for over a million man-hours worked without a disabling injury.

The company's employes as a group were granted Holmes award for working 26,444,909 man-hours over a five-year period without a fatality or permanent total disability. Service has over 2,300 employes.

Dr. Elton Soltes has been appointed general manager, gas sales and pipe line division, of **Delhi-Taylor Oil Corporation.** He will be in charge of the natural gas pipe line department and mineral exploration department.

Dr. Elton Soltes

The new division will coordinate all gas activities including sales, contract negotiations, and operations of **Delhi Pipeline Corporation** and **Natural Gas Gathering Company, Inc.,** subsidiaries of Delhi-Taylor.

Lewis W. MacNaughton and **J. Edgar Heston** has been named to the board of directors of **Cities Service Company.** MacNaughton is chairman of Degolyer and MacNaughton, Dallas. He entered the petroleum field in 1926 with Humble Oil & Refining Co. He is also a director of Trunkline Gas Company, Dresser Industries, Inc., and Republic Natural Gas Co.

Heston is president and a director of Cities Service Petroleum Company. He has been with Cities Service since 1930 and served as president of Arkansas Fuel Oil Corp. from 1956 to 1960.

Bechtel Corporation has formed a company in Australia for its engineering and construction activities and has named **W. E. Arthur,** vice president and managing director. **Bechtel Pacific Corporation**

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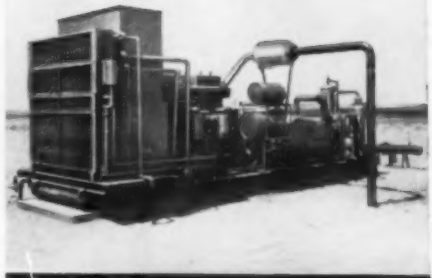

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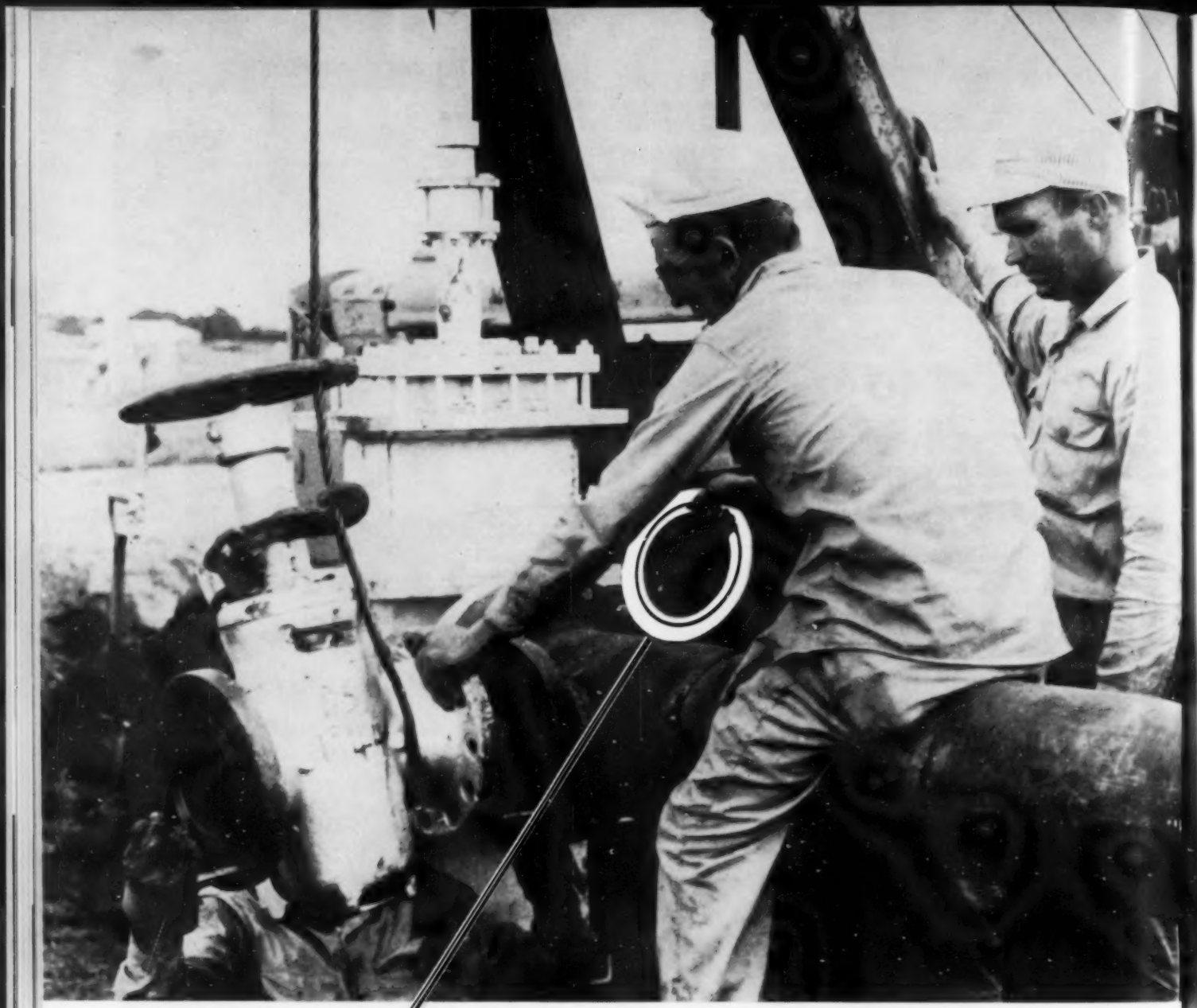
WAUKESHA MOTOR COMPANY

WAUKESHA, WISCONSIN

NEW YORK TULSA LOS ANGELES

Factories: Waukesha, Wis., and Clinton, Iowa



More Than A Gasket . . . It's Safety and Reliability Plus Re-usability!

Yes, Gask-O-Seals do cost a little more (but very **little** more) than ordinary gaskets . . . **But** they save a **lot** more in time and effort. For instance, they will tolerate flange deflection or bolt stretch; they will seal pressures beyond rated recommendations; they are fail-safe and will not leak or wear due to vibration or pulsing . . . and it is much easier and quicker to install a Gask-O-Seal. More and more pipe line engineers, refiners and processers are specifying Gask-O-Seals because of their superior reliability. Why not get the **facts** about these unique **no-leakage** gaskets.

LISTED UNDER REEXAMINATION SERVICE UL OF UNDERWRITERS' LABORATORIES, INC.

Parker SEAL COMPANY

CULVER CITY, CALIFORNIA and CLEVELAND, OHIO

Limited will have executive offices at 2 City Road, Melbourne, S.C. 4, Victoria

It will be the center of Bechtel operations in Australia and New Zealand providing engineering and construction services for pipe line, chemical petroleum, power and other industries in those countries.

Kenneth M. Leaske, comptroller and assistant treasurer, **Trans Mountain Oil Pipe Line Company,** has been named vice president of Vancouver Control of Controller Institute of America. At the Houston control meeting, **Elden P. Priebe,** controller, **Tennessee Gas Transmission Company,** was named vice president. **James T. Noel,** assistant controller, **Panhandle Eastern,** was named director of Kansas City Control. **Lauren L. Faucett,** controller of **Platte Pipe Line Company,** has been named to that board.

Robert L. Geiler has been named to the newly created position of director of training and **Russell L. Burget** has been appointed director of news bureau for **Columbia Gulf Transmission Company.**

Geiler will be responsible for planning and administering internal training programs. He had been in industrial relations department of Shell Chemical Company. Burget previously had been with United States Safety Service Company.

Brazos Engineering Company, Inc. sold its assets to **Barnwell Offshore, Inc.** of Shreveport, La. The price included $250,000 in cash and 45,400 shares of Barnwell common stock.

Humble Oil & Refining Company has transferred its Esso Safety Foundation to the Houston headquarters. It will be redesignated Humble Safety Foundation. The foundation assists schools and colleges and public and private organizations and agencies in efforts to improve street and highway safety through education, engineering and law enforcement.

Pencol Mid East, an independent Anglo-Arabian engineering consulting firm has been formed by **Pencol Pipeline & Engineering Consultants** of London. **Kenneth A. Spencer,** senior partner in Pencol, will head the new firm.

Pencol Mid East is headquartered at 67 Bella Vista Building, Rue de Phenicie, Beirut, Lebanon.

American Oil Company's Kansas City pipe line division marked a decade of accident-free operation in June. The Division completed 10 full years of operation without a lost-time accident. Employment in the division averages 66 employes and the division is responsible for construction, operation, maintenance and repair of the 1,019-mile products system from Neodesha and Wichita, Kans., to Dubuque, Iowa, and Sioux Falls, S. D.

W. B. Rennie, formerly division employe relations supervisor with **Lakehead Pipe Line Company, Inc.,** at Superior replaces Dibblee in Edmonton. **P. L. Martineau** becomes division employe relations supervisor of Lakehead with offices in Superior. **D. D. Burley** has been appointed senior engineer with Interprovincial in Edmonton. He had been in Lakehead engineering staff at Superior.

A. C. Cameron

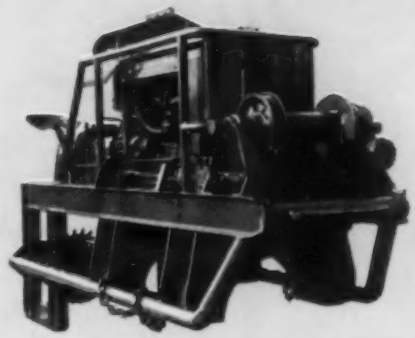
A. C. Dibblee

A. C. Cameron has been appointed management assistant for **Interprovincial Pipe Line Company** with headquarters in Edmonton. **A. C. Dibblee** formerly labor relations advisor, succeeds Cameron as employe and public relations manager in Edmonton office.

R. R. Suttle, managing director of **Southern Gas Association,** has been named a member of the gas pipe line transportation subcommittee of the **National Petroleum Council's** Committee on Oil and Gas Transportation Facilities.

The subcommittee will make a comprehensive study of the natural gas transmission systems in the United States for Secretary of the Interior, Stewart L. Udall. An advisory group has been formed including **S. Orlofsky,** vice president of **Columbia Gulf Transmission Co.; Keith Bentz,** vice president, **Natural Gas Pipeline Company of America;** and **H. F. Steen,** vice president, **El Paso Natural Gas**

C•R•C ROAD BORING MACHINES

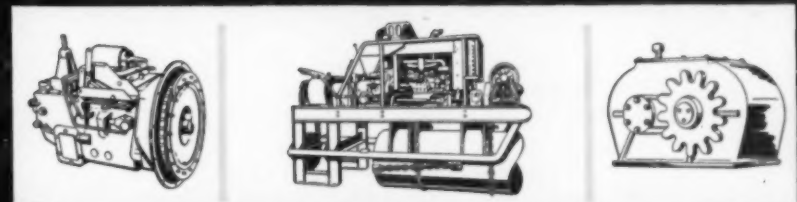


GIVE YOU MORE PROFIT PER JOB!

THESE EXCLUSIVE C·R·C FEATURES MEAN MORE FOOTAGE PER DAY: Faster Hook-Up • Easier Handling • Balance Selector Lifting Eyes • "Unitized" Design For Rugged Dependability—Minimum Maintenance.

C·R·C Road Boring Machines are available in 30″ and 42″ models.

IMPROVED ENGINEERING AND DESIGN FEATURES FIT THE NEEDS OF THE JOB TO BE DONE!



Funk Revers-O-Matic Drive gives a smooth, shock-free drive, eliminates stalling and lugging.

Pipe saddles are an integral part of "Unitized" frame, adapted to casing with liners, eliminating costly extra parts. Adjustable pull-hooks eliminate need for welding on pusher lugs.

Specially-built heavy duty speed reduction unit.

For faster, more efficient pipeline crossings, put a C·R·C Road Boring Machine on your spread. Write for detailed brochure.

CRC

CRUTCHER·ROLFS·CUMMINGS, INC.

Home Office: Houston, Texas, Box 2073, OVerland 6-4301

Export Office: D. T. O'Conner, Inc., 500 Fifth Avenue, New York 36, N. Y., BRyant 9-2236

In Canada: Canadian Equipment Sales & Service Co., Ltd., 7310 99th St., Edmonton, Alberta, Canada

Company. Orlofsky will be chairman of this group. Study is expected to be completed by the first of the year.

R. A. Metzke, manager of **United Gas Corporation's** Southwest Texas distribution division for the past nine years, has been promoted to operating manager of the company's Texas distribution division with headquarters in Houston.

The company's Southwest Texas, Beaumont, and East Texas divisions will be under his supervision.

Burton F. Wiand, vice president and director of **Cities Service Gas Company,** is being transferred to the parent **Cities Service Company** in New York City. He will coordinate industrial relations and public affairs activity for the Cities Service organization.

He has been with Cities Service since 1952 and was named a vice president of the gas company in 1959.

Robert J. Quick has been transferred from Saudi Arabia to Beirut, Lebanon and promoted to superintendent—purchase and traffic for the **Trans-Arabian Pipe Line Company.** Quick formerly was with Service Pipe Line Company.

William L. Owen has been named general counsel of **Arabian American Oil Company** succeeding **George W. Ray, Jr.,** who will act as a consultant. Owen joined the company in 1951 after serving with Trans-Arabian Pipe Line Company.

George L. Robinson, vice president operations, formerly responsible for the Eastern Products Division operations, will now direct the entire **Buckeye Pipe Line Company** system operations.

G. L. Robinson

Kenneth S. Shoemaker has been named assistant superintendent of eastern products division. **Robert J. Rippon,** formerly chief deliveryman at Utica, N. Y., replaces Shoemaker as right of way agent.

Robert Lee Sawyier, Jr., has been appointed director of commercial sales for **Pacific Gas and Electric Company. Albert B. Cook,** a 36-year veteran with the company, replaces **R. W. Joyce** as commercial manager. Joyce recently was made vice president in charge of commercial operations.

Herman Brown, president and founder of **Brown & Root, Inc.,** was a recepient of the Moles Award, an award for outstanding contributions in the field of heavy construction. It is bestowed upon a member and non-member annually. **Harry T. Immerman** of Larchmont, a Moles member, and Brown became the twenty-first pair to win the ward.

Franz X. Wernett, manager, methods and procedures, **Sinclair Pipe Line Company,** has been elected as international director of the Systems and Procedures Association of America. Wernett joined Sinclair in 1943, and has been a member of the Tulsa Chapter for four years. The board serves as a coordination body for the association. The association has 72 chapters; its objective is management improvement in business and industry.

TOGETHER FOR GOOD

Reilly Coal Tar Enamels and related primers, used together, provide the corrosion protection needed by underground metal structures. The Reilly hot enamel system is:

electrically insulated	oxidationproof
waterproof	stressproof
oilproof	tough and strong
bacteriaproof	permanently bonded

In addition, Reilly coating systems offer ultimate longevity because they inherit the chemical inertness and stability of coal tar, from which they are made.

Specify Reilly hot-applied coal tar enamels and related primers for oil, gas and water pipelines.

REILLY ENAMEL AND PRIMER

Reilly Pipeline Enamel	Reilly Pipeline Primer	Reilly Redhead® Primer
Reilly Intermediate Enamel	Reilly QD Primer	
Reilly 230-A Enamel	Reilly 230 X-10 Primer	
Reilly 230 AWWA Enamel	Reilly 230 X-10 Primer	
Reilly Hot Service Enamel	Reilly 230 X-10 Primer	

REILLY TAR & CHEMICAL CORP.
1615 MERCHANTS BANK BUILDING, INDIANAPOLIS 4, INDIANA

WHO'S MEETING WHERE

September

ISA, Fall Instrument-Automation conference and exhibit, Biltmore Hotel, Memorial Sports Arena, Los Angeles, September 11-15.

AGA, SGA, annual accident prevention conference, Statler Hilton Hotel, Dallas, September 12-13.

Mid-Continent Oil & Gas Association, Louisiana-Arkansas Division, 39th annual membership meeting, Roosevelt Hotel, New Orleans, Sept. 13-15.

National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J., September 13-15.

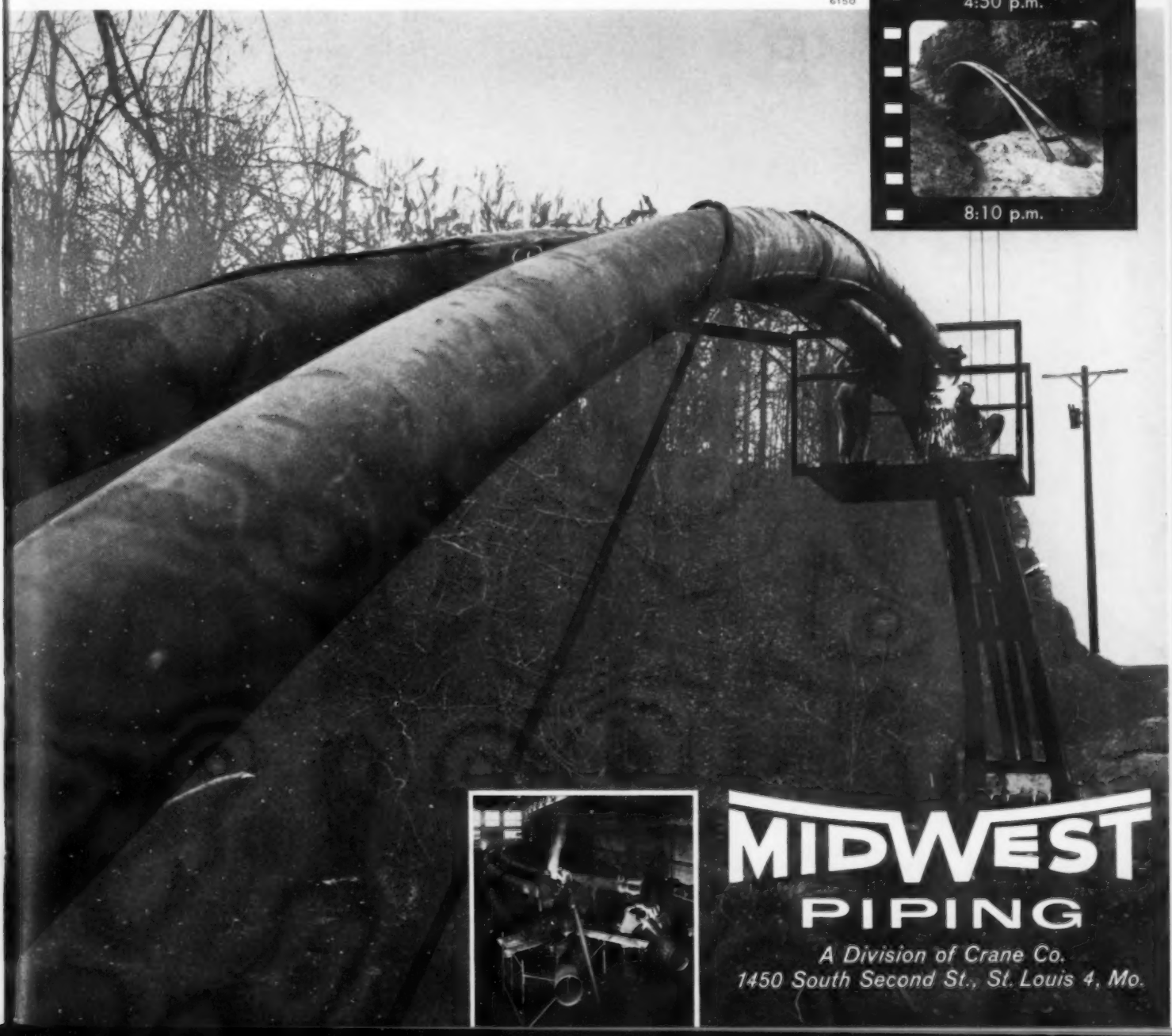
Pacific Coast Gas Association, convention and annual meeting, Coronado Hotel, Coronado, Calif., September 13-15.

Spans creek in one day with pre-fabricated pipe arch

THIS self-supporting river crossing for a 20-inch gas pipeline was installed by Laclede Gas Co. in just one 12-hour working day. Midwest Piping pre-fabricated the entire 150-foot arch and its base headers in only two sections, each consisting of a converging pair of 16″ pipes.

The only installation of its type in the country, the arch is capable of carrying 200 million cubic feet of gas daily at 880 psi over the solid rock bed of Coldwater Creek north of St. Louis. For complete information on Midwest Piping's products and services, write for Bulletin 61A, PIPELINE FITTINGS.

6150



MIDWEST PIPING

A Division of Crane Co.
1450 South Second St., St. Louis 4, Mo.

NGAA, Rocky Mountain Regional meeting, Northern Hotel, Billings, Mont., September 14.

AIEE, petroleum industry conference, New Orleans, September 17-20.

INGAA, annual meeting, Shamrock Hilton Hotel, Houston, September 18-19.

American Welding Society, fall meeting, Adolphus Hotel, Dallas, September 25-28.

NACE, Central Oklahoma Section, corrosion short course, University of Oklahoma, Norman, Okla., September 27-29.

ASME, petroleum division conference, Muehlebach Hotel, Kansas City, September 24-27.

October

AGA, 43rd annual convention, Statler Hilton Hotel and Municipal Auditorium, Dallas, October 1-4.

University of Kansas, ninth annual gas measurement institute, National Guard Armory, Liberal, Kansas, October 3-4.

NACE, Western Region Conference, Hotel Multnomah, Portland, Ore., October 4-6.

NACE, North Central Region Conference, Chase Park Plaza Hotel, St. Louis, October 9-11.

California Natural Gasoline Association, annual fall meeting, Lafayette Hotel, Long Beach, Calif., October 12-13.

ASME-ASLE, lubrication conference, Morrison Hotel, Chicago, October 17-19.

Rocky Mountain Oil & Gas Association, annual convention, Denver-Hilton Hotel, Denver, October 18-20.

American Society for Metals, 43rd national congress, Cobo Hall, Detroit, October 23-27.

Pipe Line Institute, Southwest Kansas Center, Court House, Liberal, Kansas, October 24-25.

NACE, South Central Region Conference and exhibition, Shamrock-Hilton, Houston, October 24-27.

NGAA, Southern Regional meeting, Carlton Hotel, Tyler, Texas, October 27.

National Lubricating Grease Institute, annual meeting, Rice Hotel, Houston, October 29-November 1.

NACE, Northeast Region Conference, Hotel Statler, New York City, October 30-November 2.

November

Society of Automotive Engineers, national fuels and lubricants meeting, Shamrock Hilton Hotel, Houston, November 9-10.

API, annual meeting, Chicago, November 13-15.

NGAA, Panhandle Plains Regional meeting, Herring Hotel, Amarillo, Texas, November 17.

ASME, annual meeting, Statler Hilton Hotel, New York City, November 26-December 1.

Interstate Oil Compact Commission, annual meeting, Denver Hilton Hotel, Denver, December 4-6.

1962

January

Pipe Line Contractors Association, annual convention, Boca Raton Hotel, Boca Raton, Florida, January 7-10.

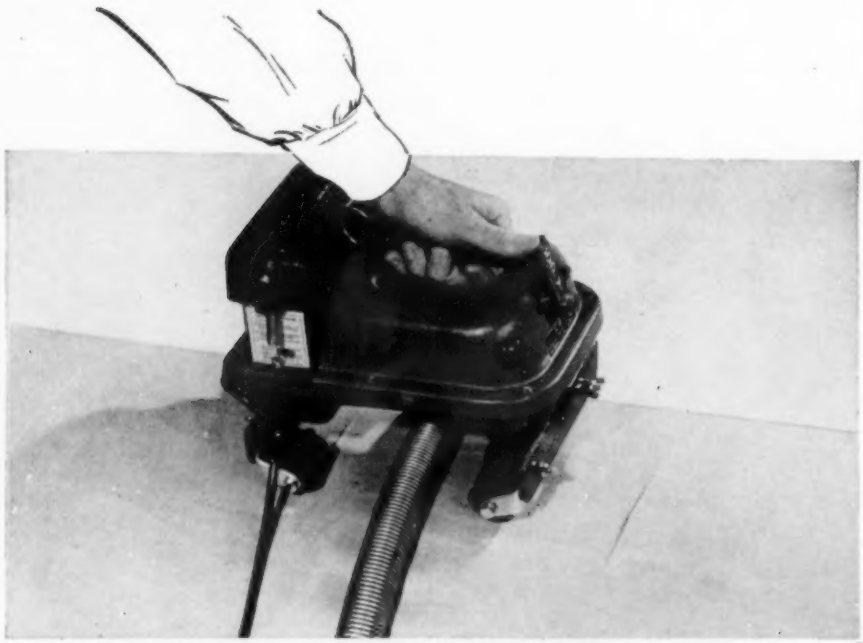
March

NACE, 18th annual convention, Municipal Auditorium, Kansas City, Mo., March 19-23.

April

PIEA-PESA, annual convention and exhibit, Dallas, April 10-12.

AGA, Transmission Section, and SGA, annual convention, Houston, April 30-May 2.



BE SURE!

ELIMINATE HOLIDAYS and their consequences with accurate, reliable SPY Holiday Detectors. Compact and light in weight for one-man operation. Carrying or rolling models available. Detectors set to your job specifications:

- **all voltages**
- **all pipe sizes**
- **all types coatings**

Anywhere in the world
SPY
HOLIDAY DETECTORS
are as near as your telephone. In emergencies our own plane assures immediate service.

Spy Detector
QUALITY SERVICE

is there . . . when you need it

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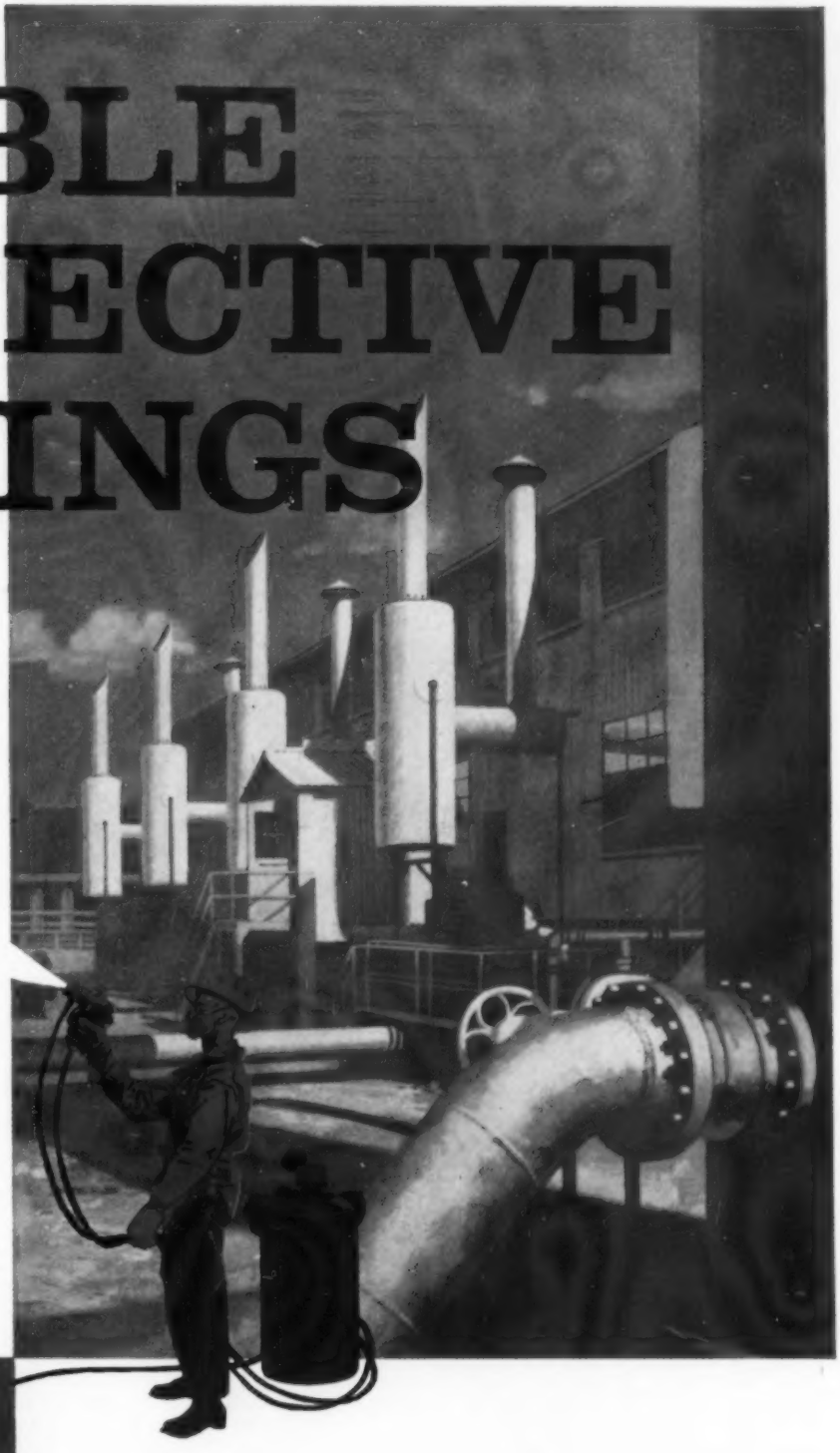
New developments
help pumping stations fight rust, corrosion

HUMBLE PROTECTIVE COATINGS



Off the press soon—the handbook Humble PROTECTIVE COATINGS gives you new weapons to fight the high cost of corrosion.

Humble has *improved* compressor station coatings for stacks and other hot surfaces, for exposed or submerged pipes, for protecting pipes *internally*, for finish-painting (with added resistance to chemical attack), for masonry and metallic structures, and for precision parts or complete engines in storage.

These coatings are available now from Humble Bulk Plants. And they're all described in the new handbook. For your free copy, write Humble Oil & Refining Company, Houston, Texas.

ENCO PRODUCTS

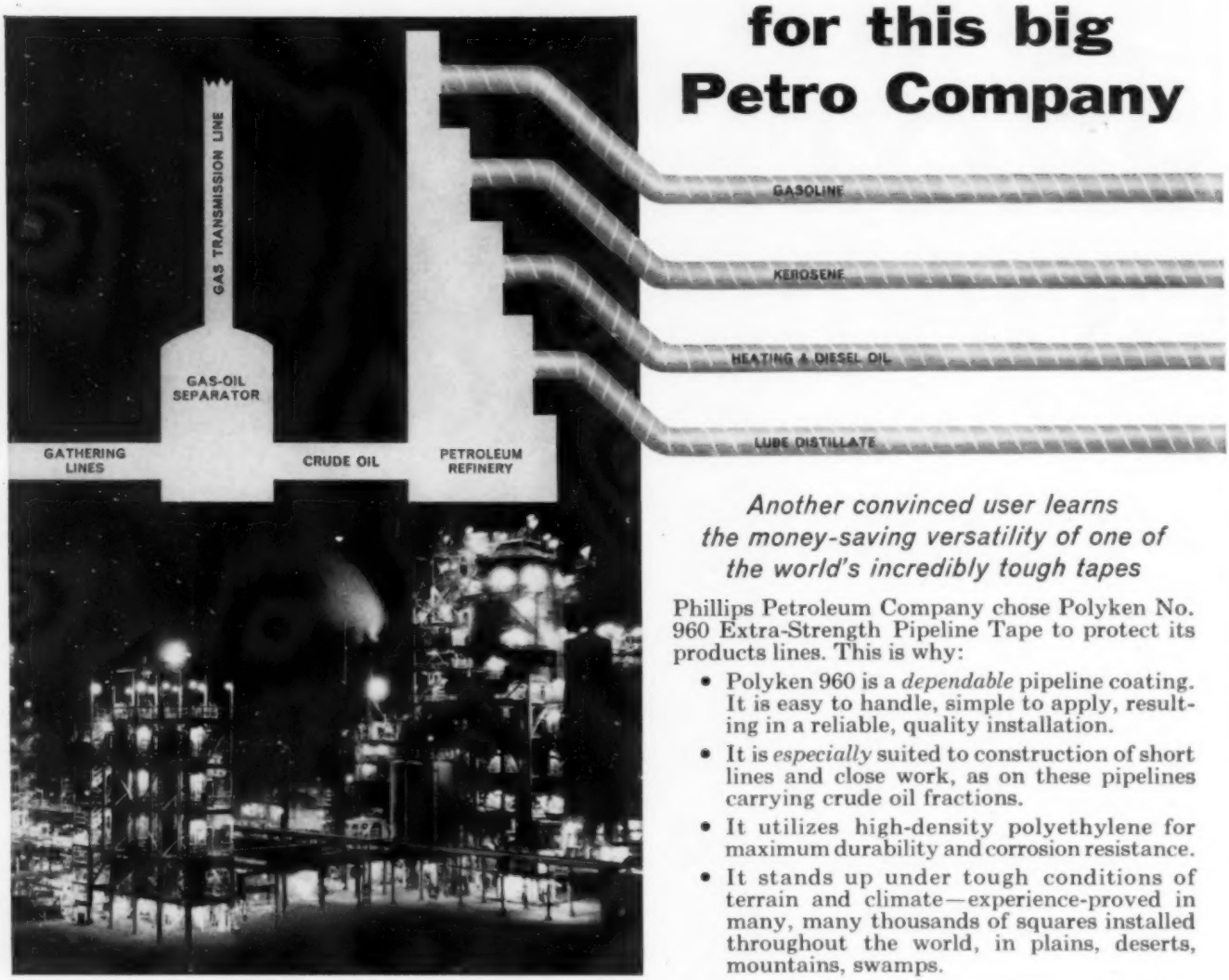
HUMBLE OIL & REFINING CO.

America's Leading ENergy COmpany

For more data on advertised products, use cards, last page.

Polyken tape protects products lines

for this big Petro Company



Another convinced user learns the money-saving versatility of one of the world's incredibly tough tapes

Phillips Petroleum Company chose Polyken No. 960 Extra-Strength Pipeline Tape to protect its products lines. This is why:

- Polyken 960 is a *dependable* pipeline coating. It is easy to handle, simple to apply, resulting in a reliable, quality installation.
- It is *especially* suited to construction of short lines and close work, as on these pipelines carrying crude oil fractions.
- It utilizes high-density polyethylene for maximum durability and corrosion resistance.
- It stands up under tough conditions of terrain and climate—experience-proved in many, many thousands of squares installed throughout the world, in plains, deserts, mountains, swamps.
- Its cathodic protection requirements are low.

AND . . .

- It saves money: Polyken 960 goes on fast with less men per job, covers more miles per day. Less equipment, less handling costs. More savings over the old hot dope idea.

See your Polyken Man . . . call your Polyken Tape Coating Distributor . . . or write Polyken, 309 West Jackson Blvd., Chicago 6, Illinois.

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Phillips pipe is cleaned and wrapped by Brodie Construction Company in a single factory-smooth operation. No primer, no drying or cooling. No fumes or fire hazards.

Polyken®

EXPERIENCED IN PROTECTIVE COATINGS

THE KENDALL COMPANY
Polyken Sales Division

POLYKEN
PROTECTIVE
COATINGS
DISTRIBUTORS

Atlanta, Georgia
Steele & Associates, Inc.

Billings, Montana
Western Corrosion Service

Chicago, Illinois
Sales Engineering, Inc.

Cicero, Illinois
Midland Pipe & Supply Co.

Cincinnati, Ohio
Hare Equipment

Cleveland, Ohio
The Harco Corp.

Denver, Colorado
Patterson Supply Co.

Houston, Texas
Cathodic Protection Service

Jackson, Michigan
Utility & Industrial Supply Co.

Kansas City, Missouri
H. J. Hodes Co.

Long Beach, California
Barnes & Delaney

Memphis, Tennessee
General Pipe & Supply Co.

Minneapolis, Minnesota
Simcoe Equipment Co.

New Orleans, Louisiana
L. F. Gaubert & Co.

Philadelphia, Pennsylvania
Harold N. Davis Co.

Plainfield, New Jersey
Stuart Steel Protection Corp.

San Francisco, California
Incandescent Supply Co. of Calif.

Spokane, Washington
Jan-Tan Corp.

St. Louis, Missouri
Corrosion Products, Inc.

Tulsa, Oklahoma
Midwestern Pipe Line Products Co.

Polyken
Experienced in modern PROTECTIVE COATINGS

What's Happening among SERVICE and SUPPLY MEN

T. D. Williamson Names D. R. Westbo Sales Engineer

Donald R. Westbo has been appointed factory sales engineer in the Gulf Coast area for T. D. Williamson, Inc. He will be headquartered in the Houston offices. He has worked with cathodic protection, rectifier design, and pipe coating materials. Westbo joined the company after serving as a sales engineer with Holcomb Company, Inc.

D. R. Westbo

William J. Wilson Named Wheeler Personnel Manager

William J. Wilson has been named personnel manager of C. H. Wheeler Manufacturing Company. He had been associated with Sandura Company's Fullerton, Pa., plant.

Gordon Named Manager at Case's Iowa Plant

Kenneth W. Gordon has been appointed manager of product engineering at the Burlington, Iowa plant of J. I. Case Company. He had been at Churubusco, Ind.

Other appointments include Malvern S. Baker named chief engineer, production division; Kay Miller, chief engineer, crawler division, and Elton B. Long, chief engineer, wheel and crawler equipment.

Pittsburgh Chemical Company Appoints Aztec Sales Agent

Aztec Tubes, Inc., Houston, has been named a sales agent for Pittsburgh Chemical Company to handle pipe line enamels, Tarmastics and Tarset in Texas, Louisiana, New Mexico and Mississippi.

Electro-Mechanical Co. Doubles Plant Facilities

Dynel, Inc., manufacturer of pulse code telemetry and control systems, has doubled its facilities by moving into a new 18,000 square foot building at 12923 South Spring Street, Los Angeles.

Dynel produces controls for pipe line, petroleum and chemical industries.

New York Air Brake Co. Acquires B-I-F Industries

New York Air Brake Company has acquired B-I-F Industries which will become a division of the company. B-I-F continues in Providence, R. I., under the same operating management with no change aims and objectives.

Gerald L. Phillippe Elected President of General Electric

Gerald L. Phillipe has been elected president and Cramer W. LaPierre executive vice president of General Electric Company. Both were named directors.

Phillippe has been comptroller and principal officer of the company since 1953. LaPierre formerly was vice president and group executive in charge of the company's electronic and flight systems group.

Bucyrus-Erie Co. Forms Midwestern Sales Region

Bucyrus-Erie Co. has formed a Midwestern Sales Region with headquarters in St. Louis. George D. Grayer was appointed sales manager of the new territory. The new region covers Kentucky, southern Indiana, southern Illinois, Missouri, Iowa, Kansas and Nebraska. Grayer had been drill sales manager for the company.

Bucyrus-Erie also announces the appointment of Alexander L. Bupp director of purchases. He formerly was director of planning. Don W. Martin was appointed manager of sales development.

RCA Communications and Controls Division Names Dunleavy Manager

Francis J. Dunleavy has been appointed general manager of Communications and Control Division, Radio Corporation of America. Formerly general manager of industrial controls, Dunleavy has been with the company since 1959.

He replaces John J. Graham, who was recently named division vice president, operations, RCA Electronic Data Processing Division.

Texas Instruments Makes Management Appointments

Ten officers and managers have been appointed new offices and a reassignment of responsibilities by Texas Instruments Incorporated. Offices and new titles include: Mark Shepherd, Jr., executive vice president responsible for all operating activities; S. T. Harris, senior vice president, in charge of corporate development; C. J. Thomsen, senior vice president, head of financial activities and corporate communications; W. F. Joyce, senior vice president, responsible for apparatus division. Cecil P. Dotson, vice president, is in charge of newly created international division.

James R. McDade, vice president, becomes head of newly created transistor product division. Jay Rodney Reese, vice president, will have charge of newly established components division. Bryan F. Smith, vice president, becomes head of corporate relations, secretary and general counsel. W. J. Wissemann is vice president in charge of government products group in apparatus division. George E. Livings was named treasurer.

For more data on advertised products, use cards, last page.

Brooks Instrument Co. Buys Francisco Engineering Company

Brooks Instrument Co., Inc., has purchased Francisco Engineering Company expanding its activities in the flow instrumentation field. Francisco manufactures turbine-type flowmeters and mass flowmeters, and associated electronic digital transmission and computer-control equipment. Francisco will be operated under the name of Hydropoise, Inc., a subsidiary of Brooks Instrument Co.

Robert C. Smith Appointed Oil Well Houston Salesman

Robert C. Smith has been appointed Houston district representative of the U.S. Steel's Oil Well Supply Division. He has been with the company since 1952.

Tinker & Rasor Acquires The Detectron Company

Tinker & Rasor has acquired the Detectron Company from Computer Measurements Corp. Detectron manufactures a line of pipe locaters which Tinker & Rasor will continue to produce. Tinker & Rasor will add these to its line of holiday detectors.

Charles D. Wood Becomes Worthington District Manager

Charles D. Wood has been selected as district office manager at Boston for Worthington Corporation. He succeeds Richard M. Cleveland who retires this month.

Wood has been with Worthington since 1939; Cleveland retires after 42 years service with the company.

CUT FUEL COSTS
BILLS
NOISE CONTROL IS OUR BUSINESS
There is a Maxim Silencer for every industrial, marine or special purpose requirement.

UTILIZE WASTED EXHAUST HEAT!

Maxim Heat Recovery Silencers can save 1,000 or more BTU per hp/hour that you are now wasting through engine exhausts.

Many industrial plants, power stations and petro-chemical installations produce enough BTU's in wasted exhaust heat to handle a large part or all of their heat requirements. Maxim Waste Heat Recovery Silencers are especially designed to turn this BTU loss into usable energy as steam or hot water.

There are valuable heat recovery possibilities in most industrial plants. For these applications or wherever there is a need to control noise or sparks, there is a Maxim Silencer designed to do an efficient job for you. Look around your plant or field installation and see if you're paying high fuel bills and wasting more heat in exhaust than you're buying in heating fuel.

A Maxim engineer is ready to work with you on your heat recovery and noise control projects . . . write or call today!

MAXIM BEAIRD DIVISION

THE J. B. BEAIRD COMPANY

A subsidiary of American Machine & Foundry Company

Shreveport, Louisiana

Sales agents in all principal cities and in many foreign countries.

Walworth Promotes Michael C. Malloy

Michael C. Malloy has been named Western Division sales manager of Lubricated Plug Valve Division, Walworth Company.

Champ Elected Director of Midwest Piping Company, Inc.

Norman B. Champ, Jr., vice president of Midwest Piping Company, Inc., has been elected a director to succeed Guy L. Morrill, retired. Champ joined Midwest in 1953. He became assistant to the president and manager of operations before being elected a vice president in 1959.

Dante E. Broggi Elected Director of American Meter

American Meter Company has elected Dante E. Broggi a director. Broggi also is vice president of the company. Prior to joining American in 1958, he had been with Neptune Meter Co.

Grove Valve & Regulator Names Adamson Application Engineer

Kenneth S. Adamson has been appointed application engineer, specializing in regulators, for Grove Valve & Regulator Company. He will be located in Grove's Los Angeles office.

Johnson Becomes District Sales Manager for Stupp

Robert M. Johnson has been named district sales manager of Stupp Corporation's Denver office. He has been a field service engineer for the past two years in Denver. Earlier he was field service engineer at Great Bend, Kansas, and Farmington, N.M.

Barrett Division Reorganizes Its Technical Department

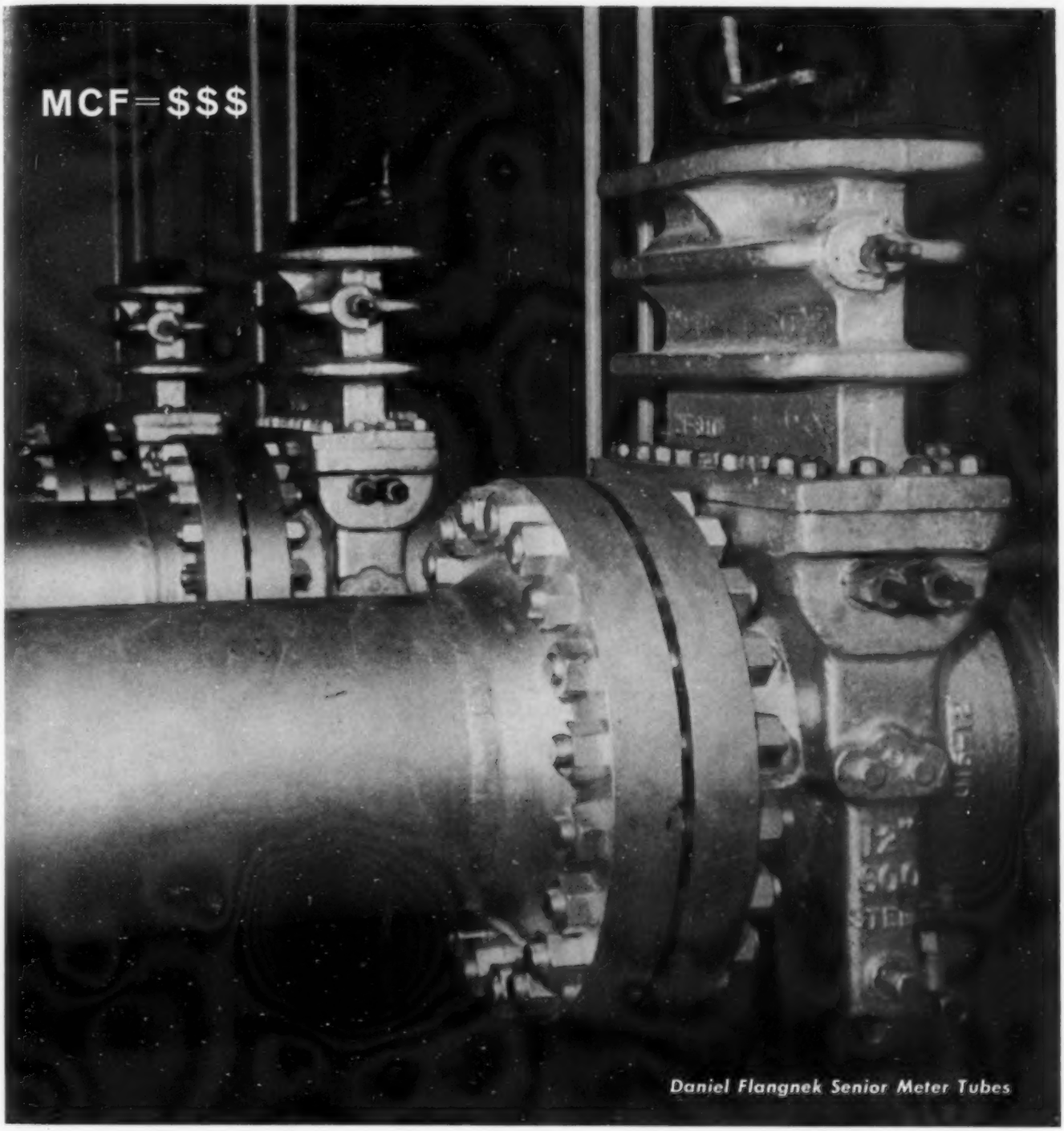
Four managers have been appointed in the reorganized technical department of Allied Chemical's Barrett Division. Joseph W. Donegan has been named to the newly created post of manager of technical service. He had been assistant to director of research and development. Richard K. Eberts becomes manager of development research. He was a section head in research and development department. Robert L. Harris was named manager of laboratory research in the technical department and Frank P. Maxwell becomes manager of development engineering in the new department.

Major Engineering Sells Rights to Jones & Laughlin

Jones & Laughlin Supply Division will acquire Major Engineering Company meter automatic custody transfer units, prover tanks, pressure switches, meter monitors and gas glasses. Stockholders have approved sale of manufacturing rights, designs, and inventory of Major automatic lease equipment.

Leeds & Northrup Co. Announces Appointments

Several changes in management personnel at Leeds & Northrup Co., have been announced. Donald E. Moat, presently vice president and director of marketing, becomes vice president—government and foreign relations. John F.



CASH REGISTERS

Natural gas changes hands in a hurry at the orifice meter station. Here is where millions of cubic feet become dollar signs. You expect optimum "cash register" accuracy and performance. You know you'll get just that with Daniel Orifice Fittings and Meter Tubes because they have the closest tolerances and are easiest to operate. Fast delivery, too. In all sizes (2"-36") and pressure ratings (125 lbs.-2500 lbs. ASA), you can depend on Daniel.

DANIEL ORIFICE FITTING COMPANY
P. O. BOX 19097 HOUSTON 24, TEXAS HO 5-3451

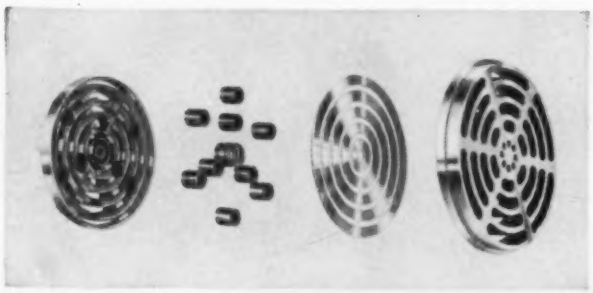
Los Angeles, Calif. • Odessa, Tex.
Corpus Christi, Tex. • Dallas, Tex.
Harvey, La. • Tulsa, Okla.
Agents in Principal Cities

212

For more data on advertised products, use cards, last page.

VOSS VALVES will mean LESS MAINTENANCE FEWER SHUTDOWNS for your COMPRESSORS

Voss Valves are made to specification, machined from solid stock (not cast)—using best alloy steels; for corrosion condition—stainless steels, such as 410, 18-8 or non-ferrous alloys—monel, inconel, etc. Plates are machined (not stamped) and ground for precise close tolerance fit; are dimensionally stable . . . ductile . . . resist fracture, high temperatures and corrosion . . . withstand fatigue. Springs of heavy rectangular sections and large diameters add to dependability and safety.



- up to 40% more valve area
- minimum pressure loss
- higher efficiency
- less power consumption
- normal discharge temperature
- quiet, vibration-free
- utmost safety
- lower operating costs

For detailed proposal send name, bore, stroke and speed of machine.

J. H. H. VOSS VALVES REG. U.S. PAT. OFF.

J. H. H. VOSS Co., Inc.
785 East 144th Street,
New York 54, N. Y.

Quereau, vice president—director of manufacturing replaces Moat. Elwood F. Rogge, North Wales plant manager, was named director of manufacturing. J. Frederick Schock, order control division manager, becomes North Wales plant manager. William M. Feeley, head of plant engineering and maintenance section, was appointed manager of plant engineering and services division.

Atlas Chemical Names Four Vice Presidents

Four vice presidents have been appointed by Atlas Chemical Company. Robert P. Barnett, general manager; Robert J. Reilly, treasurer; Dr. Walter H. C. Rueggeberg, director of research and development; and Spencer Thompson, indus-

Write for Bulletin

PIPELINE VENTS AND MARKERS

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Manuscripts Wanted

Have you written a book you would like to have published? Do you have an idea or an outline that you would like to talk over with a publisher? Gulf Publishing Company, publishers of World Oil, Hydrocarbon Processing & Petroleum Refiner and Pipe Line Industry magazines, and numerous technical books, is actively seeking trade and technical manuscripts for publication by its rapidly expanding Book Division. For further information write to Manager, Book Publishing, Gulf Publishing Company, P. O. Box 2608, Houston 1, Texas.

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8" and 10" used or new surplus steel pipe couplings, 8 thd., with or without dutchmen, any quantity, any area. Immediate inspection & prompt pickup with our own trucks. Write, wire or phone COLLECT

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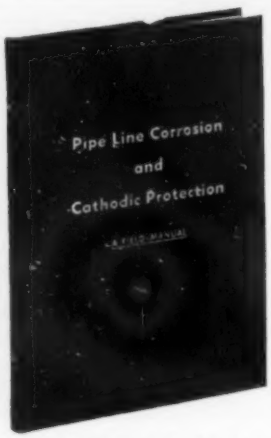
VALLEY STEEL PRODUCTS CO.
5901 S. Lamar
DALLAS 15, TEXAS
PHONE COLLECT: HA 8-1301



The most practical on-the-job manual for men concerned with pipe line corrosion.

Pipe Line Corrosion and Cathodic Protection

By MARSHALL E. PARKER

This book is designed as a practical field manual. It provides workable methods that can save you valuable time and effort in obtaining interpretive field data.

Contents (Condensed). Soil Resistivity Surveys, Pipe-to-Soil Potentials, Line Currents, Current Requirement Surveys, Rectifier System for Coated Lines, Ground Bed Design and Installation, Magnesium Anodes on Coated Lines, Hot Spot Detection, Stray Current Electrolysis, Interference in Cathodic Protection, Operation and Maintenance, Coating Inspection and Testing.

Appendices cover: Fundamentals of Underground Corrosion, Basic Principles of Cathodic Protection. Plus . . . tables and properties of metals, attenuation equations and index.
108 pages, illustrated. . . . Price $3.00

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You are on the right track here. For the big lifts or ordinary loads Leschen Red-Strand is universally accepted and demanded by wire rope users who expect and get their money's worth. • Constant research and development have provided Leschen users with a complete range of sizes and types for every conceivable task. This versatility, backed by Leschen's distribution and technical services, is your assurance of wire rope dependability for every job. • *Accept nothing less than Leschen.* For the name of your nearest Leschen distributor write: Leschen Wire Rope Division, H. K. Porter Company, Inc., 2727 Hamilton Avenue, St. Louis 12, Missouri.

PORTER ***LESCHEN WIRE ROPE DIVISION***
H. K. PORTER COMPANY, INC.

trial relations director were named vice presidents.

Thomas J. Laffey, Jr., was appointed secretary.

Garrett Corporation Opens Houston Office

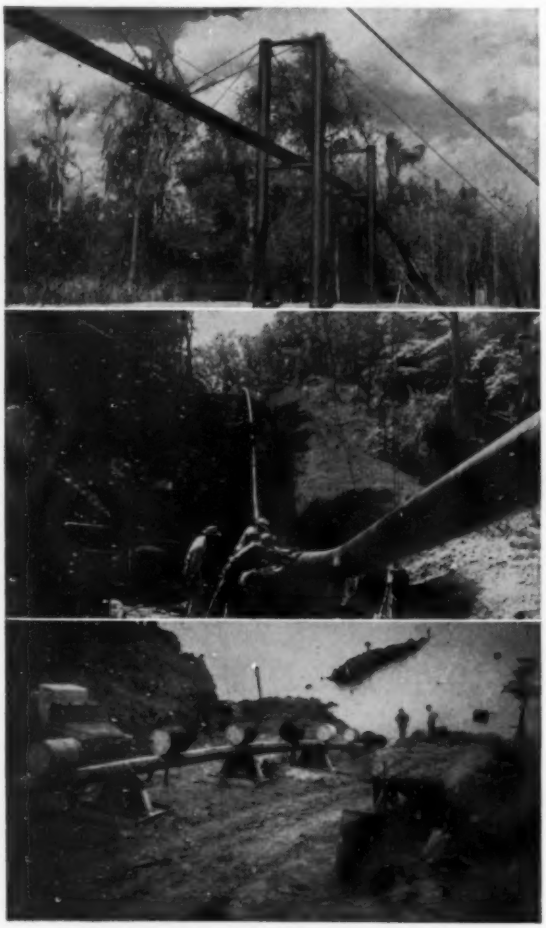
A new Garrett Corportaion sales office has been established in Houston in the Prudential Building. George Bransom will be manager of the new office. He has been with AiResearch since 1955 and was transferred to Garrett in 1960.

International Harvester Names W. M. Klett Territory Manager

W. M. Klett has been appointed a territory manager of the Southwest region for International Harvester Company's Construction Equipment Division. Located in Dallas office, Klett will cover east, central and south Texas, Louisiana and three Gulf Coast counties of Mississippi. He succeeds E. C. Price.

Dr. Charles W. Walton Named 3M Research Vice President

Dr. Charles W. Walton has been appointed vice president of research for Minnesota Mining & Manufacturing Company. He succeeds Dr. Carl Barnes. Walton formerly was vice president and general manager of the company's adhesive, coatings and sealers division.



ABOVE GROUND

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UNDER WATER

WHEREVER YOUR PIPELINE GOES
LET LATEX PUT IT THERE

General Contractors for the Oil and Gas Industry for over Twenty-Five Years.

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R. H. Welker Joins Texsteam Corporation

R. H. Welker has joined Texsteam Corporation as sales supervisor for gas control equipment. Welker had been a sales manager with Accessory Products Company, division of Textron, Inc. Texsteam recently acquired the APCO line of gas pressure reducing regulators and dump valves.

R. H. Welker

Welker is the developer of the Jet Stream regulator and Check Stream dump valve now handled by Texsteam. Welker had been with Tennessee Gas Transmission Company prior to joining APCO.

Crane Co. Acquires Two Subsidiaries

Crane Co. has acquired operating assets of AllianceWare Inc., subsidiary of American Metal Products Co., and purchased substantially all assets of the Deming Company, Salem, Ohio. Crane also has established a new French operating company, Cie Crance, headquartered in Paris.

AllianceWare was acquired for 231,674 shares of Briggs Manufacturing Company common stock and $3.5 million. The Deming sale is estimated at $5 million. In forming the French company, Crane merged J. Cocard of Lille and C.I.C.R.A. (Cie. Industrielle & Commerciale De Robinetterie, Raccords & Accessories) of Paris. Both companies were affiliated with Crane.

Jaynes Named Vice President Of Pittsburgh Chemical Company

William H. Jaynes has been appointed a vice president of the protective coatings division of Pittsburgh Chemical Company. He had been general manager of that division since joining the company earlier this year.

Young Radiator Company Names Frost Distributor

The Young Radiator Company has appointed Frost Engineering Service Company a representative for its heat exchanger and industrial and oil field division in the Southern California district.

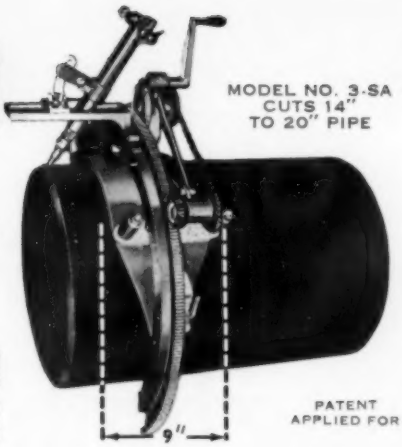
Frost has offices at Huntington Park, Calif., and San Francisco.

Allis-Chalmers Appoints Dealers in Two States

Berry Equipment Company has been appointed dealer in 12 Texas counties for Allis-Chalmers Manufacturing Company utility wheel and compact crawler tractors. Coastal Plains, Inc., was named engine dealer in 32 counties in Texas and Bannock Steel Corporation, Boise, Idaho becomes Allis-Chalmers engine dealer in 34 counties in Idaho, one in Oregon and two in Wyoming.

Coastal Plains is located in Dallas, and Berry Equipment is headquartered in Fort Worth.

NEW!



MODEL NO. 3-SA
CUTS 14"
TO 20" PIPE

PATENT
APPLIED FOR

FEATURING BALANCED RING GEAR-SADDLE ASSEMBLY!

LIGHTER WEIGHT! EASIER TO USE!

MOUNTS AND CUTS ON SHORT LENGTHS OF PIPE!

- It's extremely lightweight.
- It's easier to handle and operate with the new balanced design.
- Requires only ½ the storage space of competitive pipe beveling machines.
- Can be operated on shorter lengths of pipe for seating the machine and cutting, making it more versatile.
- More rugged . . . this new design produces a more stable ring gear assembly, which is less likely to spring or warp.
- Retains extreme accuracy of cuts, which all Mathey Pipe Beveling Machines are noted for.
- Available in all sizes, from No. 1 to No. 5 machines.

Call or Write for Further Information or Demonstration.

C. A. Mathey MACHINE WORKS, INC.
212 S. Frankfort Tulsa, Okla. • Box 1159 • LUther 7-3311

NEW "SWEEGEE" PIPELINE PIGS

- SAFE
- NO METAL PARTS
- LIGHT WEIGHT
- EASY TO HANDLE
- ECONOMICAL
- FLEXIBLE

16" and 36" SWEEGEES

The SWECO "SWEEGEE"* is used in pipelines for removal of water after hydrostatic tests, removal of sand and debris, and for purging of air. The "SWEEGEE" will perform virtually all functions of the conventional cup-type pig. The "SWEEGEE" fits all pipeline jobs . . . gas, crude, product, and performs well in LPG service. The "SWEEGEE" has been purchased and proven in use by many pipeline companies.

The foamed, homogeneous construction assures continuous, full-surface contact through bends, sags, valves and chill rings. The "SWEEGEE" will go around 90° or 180° bends, pass through lines with varying wall thicknesses, such as river crossings, as well as through pipe with varying diameters.

It is excellent for use in internally-coated pipe since it contains no metal. It's easy to handle due to the extreme light weight. An 8-inch "SWEEGEE" weighs less than a pound, a 20-inch less than 15 pounds. The cost is so low that a large inventory can be maintained with a small investment. In many cases, the cost of one "SWEEGEE" is less than that of just one cup for a conventional cup-type squeegee of the same size.

Manufactured by SWECO, Inc., Prudential Bldg., Houston 25, Texas. Sold by Southwest Equipment Co. and other leading distributors.
* patented

SWECO Prudential Bldg. Houston 25, Texas

L. C. RUSSELL COMPANY

INTERNAL PIPE COATING CONTRACTORS

★ *Increased Thru-put*

★ *Cuts Maintenance Cost*

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HOT & COLD APPLIED COATINGS

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long lengths for economy

Long lengths of pipe mean fewer welds in the field . . . and fewer welds mean greater economy. It's as simple as that.

Bethlehem produces electric resistance-weld line pipe in lengths to 62 ft. Diameters range from 5 5/16 in. through 16 in. OD. It's all first-rate pipe, meeting API 5L (Grades A or B) or 5LX (X42, X46, or X52) specifications.

We make ERW pipe at Sparrows Point, Md., where we also produce continuous buttweld line pipe in sizes from ½ in. through 4½ in. OD in strict conformity with API 5L specifications.

BETHLEHEM STEEL COMPANY

BETHLEHEM, PA.

BETHLEHEM STEEL

For a full line of line pipe

thick walls for safety

3/4 in.

When pipe lines pass through built-up areas, safety becomes a primary consideration. The applicable codes often demand special practices, including thick-walled pipe.

That's where Bethlehem comes in. We make line pipe with ¾-in. walls from 18 in. through 42 in. OD, in 40-ft lengths. In fact, we are supplying a major gas transmission company with 36-in. OD pipe with walls measuring .844!

Bethlehem's large-diameter line pipe is electric fusion-welded and cold-expanded at our Steelton, Pa., mill—probably the most modern in the industry.

Steel

for Strength
. . . Economy
. . . Versatility

Export Sales: Bethlehem Steel Export Corporation

call BETHLEHEM STEEL

What's New in EQUIPMENT

Foamed Plastic Pig

Designed especially for removal of water after hydrostatic tests on pipe lines, a foamed plastic pig has been developed by Sweco, Inc. The "Sweege" is a foamed plastic, molded in cylindrical, bullet-like form and available in sizes up to 48-inch.

It is applicable for all pipe line jobs, gas, crude or product. The pigs can be used for removal of liquids, sand, debris, and distillate. The foamed, homogeneous construction assures continuous full surface contact through bends, sags, valves and chill ring. It is designed to go around short radius 90 degree or even 180 degree bends. It can pass through lines with varying diameters. With no metal parts it will not damage internal coatings on lines. For open-end pigging, catch joints are unnecessary as the light weight Sweege will not be damaged on a low-pressure ejection at end of run.

The lightweight 8-inch pig weighs less than a pound and a 20-inch unit tips the scale at about 15 pounds.

For more data, circle **No. E1** on Readers' Service Card, last page this issue.

Better Sensitivity

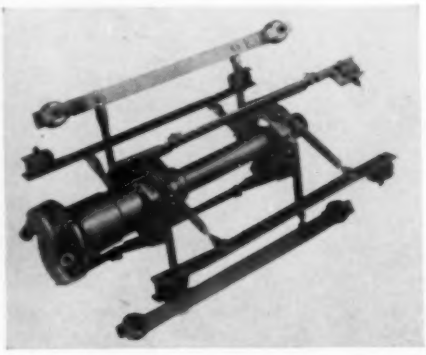
A range and sensitivity extending resonator—RASER—has been produced by General Electric Company to improve distance covered by transistorized two-way radio sets in cars up to 43 percent, while providing clearer, sharper, more distinct messages.

All equipment supplied with this new instrument will have sensitivity better than 0.5 microvolts—the first time such equipment has reached this figure. A triple-section miniaturized cavity filter and a transistorized amplifier in front end of completely transistorized receiver to increase selectivity make up the RASER circuit design.

For more data, circle **No. E2** on Readers' Service Card, last page this issue.

Internal Pipe Cleaner

An internal pipe cleaner that reduces material and labor costs has been introduced by Clemtex, Ltd. The "Spin-Blast" unit eliminates need for rotation of pipe for internal cleaning. It is made up of nozzle head, feeder tube, governor, bearings, seal and adjusting screw and governor housings, bearing and seal.



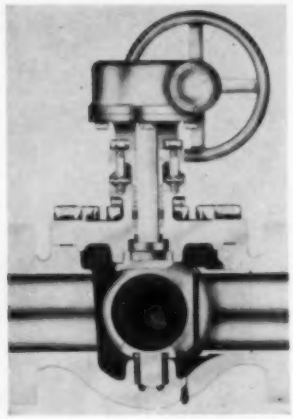
The cleaner is designed to remove rust, paint, carbon, mill scale, and other foreign deposits in pipe from 6-36-inch. All types and sizes of abrasives, including peening shot can be used with the machine.

For more data, circle **No. E3** on Readers' Service Card, last page this issue.

Mastic Colloidal Resin

Ric-wiL, Incorporated has developed a new coating called Rip-Coat. It is a mastic colloidal resin which is unaffected by temperatures from below zero to 250° F. It is for use on pipe field connections and is brushed on welded area and followed with a glass-wrap material and a second coating of Rip-Coat.

For more data, circle **No. E4** on Readers' Service Card, last page this issue.



Ball Valve

Featuring hard metal-to-metal seating surfaces which assure tight shut-off and permit valve to be used at high temperatures, General Kinetics Corporation has developed a ball valve—the Ludeman Rotoflo valve. An eccentric cam action of the stem lifts the ball away from the seat before it is turned, eliminating sliding friction on the seats.

Other design features include full-round flow passage, fast opening and closing, and a locking action that assures tight shut-off when line pressure is reversed.

For more data, circle **No. E5** on Readers' Service Card, last page this issue.

Electric Pulser

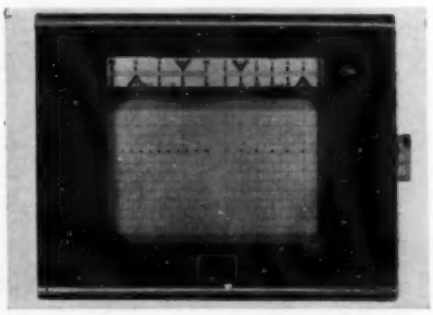
A labor-saving electric pulser and transmitter has been introduced by Ralph N. Brodie Company. Designed as a meter driven accessory to operate various types of electrical equipment in direct proportion to meter thruput,the pulsers can be used in all work areas of petroleum industry including pipe line and LACT installation.

The 5,400 series electric pulser is of sufficient size to incorporate the gearing necessary for barrel, Imperial gallon and metric registration.

For more data, circle **No. E6** on Readers' Service Card, last page this issue.

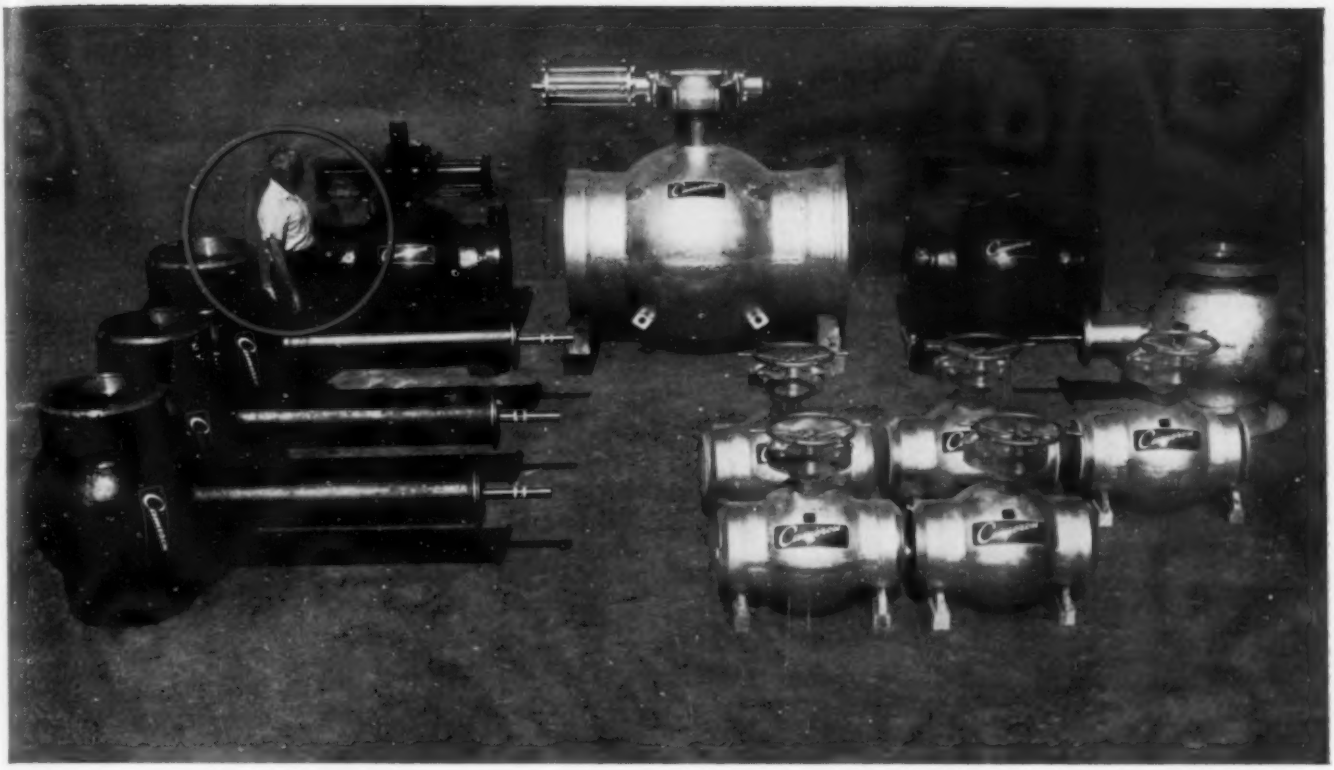
Four-Way Recorder

A new 4-pen recorder has been produced by Bristol Company. The Electronic Dynamaster is designed for use where space is a problem or where simultaneously recorded variables must be compared on a time basis. It records any set of variables that can be transduced into an electrical quantity.



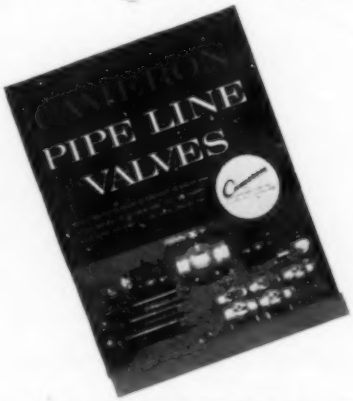
Each pen has its own motor driven balancing unit. This gives ample torque for auxiliary functions such as transmitting slidewires and alarm contacts.

For more data, circle **No. E7** on Readers' Service Card, last page this issue.



ACCEPTED BY PIPE LINES

Cameron Ball Valves are winning increasing acceptance by pipe line companies the world over. The companies like the compact design, the simplicity and the light weight in comparison with conventional valves. Cameron Ball Valves are easier to handle and easier to coat than conventional valves. There are no bonnets or glands to leak, and no lubrication is required either for sealing or to reduce friction in operating the valve. Torque required to operate the valve is amazingly low because the pressure of fluid against the ball is carried by low friction Teflon bearings, and the seat ring area in contact with the ball is small. A tight shutoff for countless operations is insured by the rotating seat design.



Ask a Cameron representative or write for a pipe line valve catalog.

Cameron

CAMERON IRON WORKS, INC.
P. O. BOX 1212 • HOUSTON, TEXAS

CAMERON BALL VALVES

For more data on advertised products, use cards, last page.

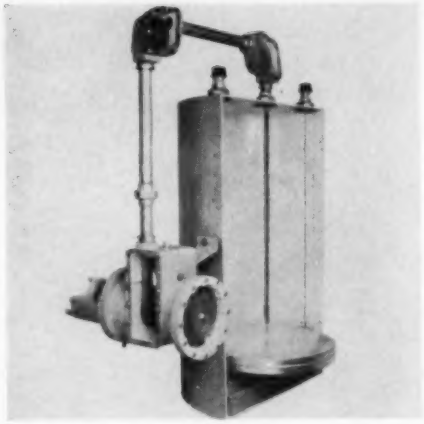
Float Gage

Instruments, Inc., announces a new float operated tank gage, the Dir-O-Gage. It is supplied with all components and hardware for installation on bolted or welded tanks up to 24 feet in height.

The units have easy to read dials calibrated in feet, inches, and ⅛-inches; neg'ator motor rewind, no counter weight; and up to 8 individually adjustable electric alarm switches—explosion proof.

(This item supplements Instruments, Inc. data on Page 237 of the Pipe Line Catalog, Third Revision.)

For more data, circle **No. E8** on Readers' Service Card, last page this issue.



Portable Housing

The economy S and economy SP lines of portable field housing have been introduced by Porta-Kamp Manufacturing Company, Inc. Buildings are skid mounted, can be shipped erected or reduced to 1/5 size.

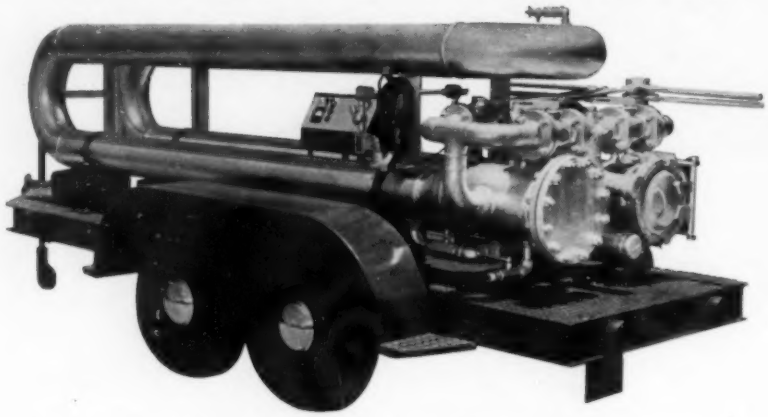
Economy S sizes range from 8 by 10 feet to 10 by 24 feet units. Combination unit sizes range from 16 by 10 feet to 15 by 24 feet. The SP sizes come in 8 by 32, 10 by 30, 10 by 40 and 10 by 50 feet. These are permanently erected structures.

(This item supplements Porta-Kamp Manufacturing Co., Inc., on Pages 334-337, of Pipe Line Catalog, Third Revision).

For more data, circle **No. E9** on Readers' Service Card, last page this issue.

POSITIVE DISPLACEMENT

METER PROVERS



Maloney's Bi-Directional Trailer-Mounted Meter Prover . . .

. . . is the latest solution to fast, accurate liquid meter proving. Ideal for proving LACT or other widely separated meters, this portable prover is precision-built under constant engineering supervision, calibrated and certified. The rugged-built trailer meets ICC safety requirements and provides maximum mobility on highways and on rugged terrain.

Maloney meter provers offer:

Speed . . . One operator can prove an LACT unit in 15 or 20 minutes.

Accuracy . . . The majority of Maloney provers have experienced from .01 to .02 of 1% repeatability.

Ease of Operation . . . Meters are proved on stream under true operating conditions using actual line fluid. No prover tanks are necessary.

Economy . . . Savings are realized in the amount of time and number of personnel necessary to prove meters and in the expense of the equipment needed.

The trailer-mounted prover is one of five standard models built by the F. H. Maloney Company. Others are the Skid-Mounted Bi-Directional, the U-Bend, the Interchange and Loop Assembly, and the Interchange Unit. Also, the Maloney Company can design and build provers to meet other particular specifications. The Company has an Engineering Design Service to solve meter proving problems, including those of design, fabrication, or installation. For a complete description of Maloney Meter Provers and Design Service, please write the Company's Houston office for Bulletins MP-1 and MP-2.

"Since 1932 Precision in Rubber—Metals—Plastics"

F. H. MALONEY COMPANY

P. O. BOX 1777 / HOUSTON, TEXAS

OFFICES IN LOS ANGELES • PITTSBURGH • TULSA

Plug Injector

A Kinney plug injector with a pressure capacity of 5,500 pounds has been manufactured by Alco Products, Inc. The injector has rubber seat sealing elements to seal high pressure gas and distillate service. It is for use in cleaning paraffin and sand from pipe lines.

The injector permits use of soluble asphalt-base plug or non-soluble, brush type pig to clean walls.

For more data, circle **No. E10** on Readers' Service Card, last page this issue.

Teflon-Sleeved Valves

Continental Manufacturing Company announces a line of 8-10-12-inch teflon-sleeved plug valves. These valves feature teflon sleeves; absence of sediment catching

flow pockets; quick, easy operation automatic or manual; and wiping action of sleeve on the plug as it rotates to keep it clean.

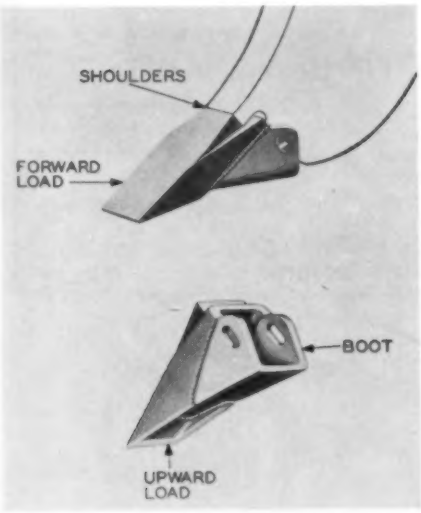
It has internal ribbed construction which locks the sleeve in place while allowing sleeve expansion and construction. Metal construction is fully enclosed, exposing no teflon and providing double sealing against leakage to the outside.

For more data, circle **No. E11** on Readers' Service Card, last page this issue.

Air Compressor

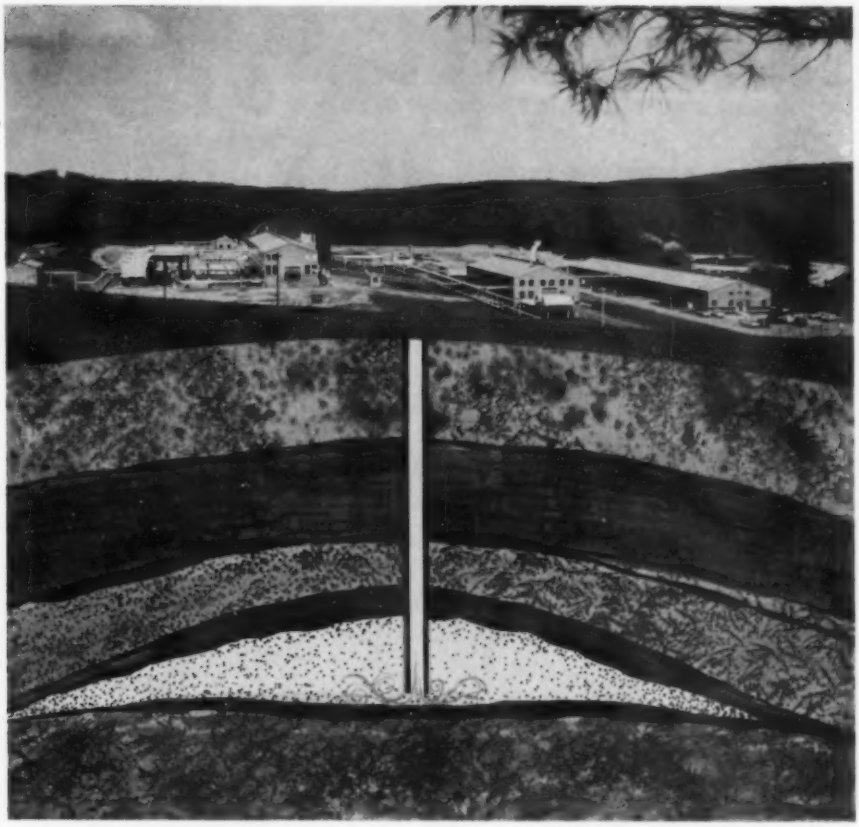
Le Roi Division, Westinghouse Air Brake Company, has developed a new series of air cooled stationary compressors designed to deliver from 200 to 600 cfm of air at 250 psi. Ratings are supplied by three and six cylinder versions of two basic models. These self-contained units operate with a load-unload pressure control system.

For more data, circle **No. E12** on Readers' Service Card, last page this issue.



Ripper Improvements

Improved design tips and shanks for Caterpillar Tractor Company No. 8 and 9 tractor-mounted rippers has been announced. Tips are of two configurations, one for high impact applications, the other for use in highly abrasive material. Both are fabricated from alloy steel, hardened to Rockwell C50. Tips are composed of forged baseplate and a die-



How Transco takes up the Slack Between Gas Supply & Consumption

Storing natural gas underground in depleted gas producing areas of Pennsylvania is an important part of Transco's business. The company's customers have large space heating loads in the winter which would be costly to serve if pipe line facilities had to be built between Texas and New York just for this purpose. Instead, Transco has developed for its customers a sort of "Christmas Club" whereby the customers authorize the company to store gas for their accounts in the low load periods of summer, delivering this gas in winter over short lines from the storage fields which are close to the metropolitan market area. Thus, while purchasing gas on a year-round basis, Transco, through underground storage, takes up the slack between supply and ultimate consumption of natural gas, effecting operational economies for both producers and marketers.

CARRYING NATURAL GAS FROM TEXAS AND LOUISIANA TO THE MARKETS WHERE THE MOST PEOPLE ARE.

TRANSCONTINENTAL GAS PIPE LINE CORPORATION

For more data on advertised products, use cards, last page.

How ALLIED PIPELINE ENAMELS serve you BETTER!

ALLIED PIPELINE ENAMELS AND PRIMER were used on the Mustang Fuel Corporation's new Mustang Transmission Line (shown above).

From America's Heartland-Performance-Proved ALLIED ENAMELS speed to your job . . .

Fast service! From Allied Material's Stroud, Oklahoma plant. The pipeline industry's ONLY producer of BOTH coal tar and asphalt pipeline enamels gives you fast and efficient service . . . wherever in the nation you require a tough, durable pipeline enamel of your job.

Lengthy research and thorough testing in the laboratory and on-the-job have proved the superior time and money-saving qualities of ALLIED Pipeline Enamels.

Specify ALLIED Pipeline Enamels for your job and get the solid backing of Allied Materials Corporation's long research and lengthy experience with specialized coal tar and asphalt products . . . such as the Superior concrete joint sealant, ALLIED Jet Seal, in use on major construction projects the world over.

For complete information about ALLIED Pipeline Enamels, write to The Pipeline Materials Division of Allied Materials Corporation, at this address:

ALLIED PIPELINE ENAMELS

Coal Tar Base
Allied Standard Pipeline Enamel
Allied Intermediate Pipeline Enamel
Allied Plasticized Pipeline Enamel
Allied Waterworks–AWWA Enamel

Coal Tar Primers
Allied Coal Tar Primers
Allied Waterworks–AWWA Primer

Asphalt Base
Allied Modified Pipeline Enamel

Asphalt Primer
Allied Pipeline Primer

ALLIED PIPELINE ENAMELS

ALLIED MATERIALS CORP.

PRODUCERS, REFINERS AND COMPOUNDERS
OF SPECIAL ASPHALT AND
COAL TAR PRODUCTS FOR OVER 29 YEARS

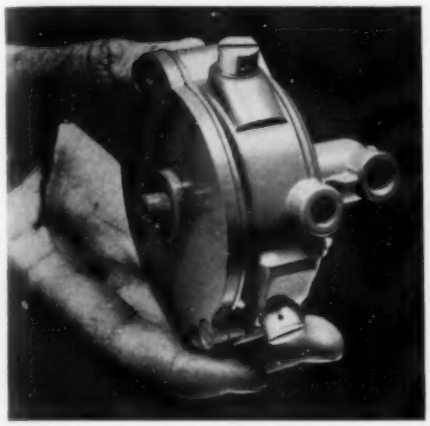
ALLIED BUILDING • 5101 N. PENNSYLVANIA • P. O. BOX 7278 • 39TH STREET STATION • OKLAHOMA CITY, OKLAHOMA
PLANTS: STROUD, OKLA. • DETROIT, MICH.

formed wrapper or boot, joined by a high penetration weld. The impact tip costs less than half as much as earlier impact tip.

New abrasion tip provides 75 percent more wear material than its predecessor, and costs a third less. It is longer, thicker, heavier and tapers to narrower point than the new impact tip.

(This item supplements Caterpillar Tractor Co. data on pages 66-69 of the Pipe Line Catalog, Third Revision.)

For more data, circle **No. E13** on Readers' Service Card, last page this issue.



Auxiliary Governor

An auxiliary governor system to control speed of power equipment with a wide variation in load requirements has been introduced by Holley Carburetor Company.

It is designed to automatically adjust power supply to keep power take-off speed constant. It can be used to control hydraulic or mechanical devices powered by gasoline engines. The system operates from a driven unit mounted on the power take-off and automatically adjusts throttle to maintain specified speed of work tool with every change in load. It can operate with engine speed governor, or installed between carburetor and manifold on engine without speed governor.

For more data, circle **No. E14** on Readers' Service Card, last page this issue.

Concrete Etcher

A new acid product designed to etch concrete on construction jobs has been developed by Brick Research Associates. The Fluruatic acid comes in dry powder form and can be mixed on the site. It comes in easily handled fiber drums from 20 pounds up to 400 pounds.

For more data, circle **No. E15** on Readers' Service Card, last page this issue.

Chopper

A new rolling chopper, SS1012, for use in right of way work, has been added to Fleco Corporation line. The chopper, when filled with water, weighs approximately 25,000 pounds. The 12 high-carbon steel, abrasive resistant cutting edges are reversible. The drum is equipped with tapered roller bearings supporting the one piece, continuous axle.

For more data, circle **No. E16** on Readers' Service Card, last page this issue.

Filing Cabinet

A filing cabinet for filing engineering drawings, blueprints, and maps complete with 22 binders, 24-inchs in length has been added to Dancer Strikfile Company's line.

It accommodates prints up to 24 by 36 inches and binders hold from 1 to 75 prints each for a total capacity of 1650 prints. The cabinet has celing-mounted traverse tracks for hanging specially designed binders. The cabinet has a top that can be used as additional advantage for table space for reference purposes or working area.

For more data, circle **No. E17** on Readers' Service Card, last page this issue.

How to control pipeline corrosion for $0.0011 per barrel

As a pipeline operator, you know what internal corrosion of the line can mean in reduced lifetime, decreased throughput, frequent scraper runs, premature replacement of filters, meters and valves – as well as product contamination.

Du Pont RP-2, an oil-soluble corrosion inhibitor, effectively reduces such corrosion and the problems it causes. Added at the refinery or pipeline, Du Pont RP-2 forms a protective film on the inside of the pipe. This film creates an effective barrier against the dissolved or entrained oxygen and water in the piped distillate.

Such protection is possible with an average dosage of only 2 pounds of RP-2 per 1000 barrels of product – $0.0011 per barrel. The additive is readily available throughout the United States.

Complete details are contained in our Tech Memo, "Du Pont RP-2 as a Pipeline Corrosion Inhibitor". For your free copy, write: E. I. du Pont de Nemours & Co. (Inc.), Petroleum Chemicals Div., Room 7450 Nemours Bldg., Wilmington 98, Del.

Lead Antiknock Compounds and other Petroleum Additives

DU PONT

Better Things for Better Living . . . *through Chemistry*

Pipeline Repairs are always quicker and safer with the

Completed Installation
(Patent Applied For)

Completed Installation
(When welding is specified)
(Patent Applied For)

SMITH PLIDCO SPLIT-SLEEVE

Drastically reduces downtime losses
Permits welding while pumping

Nothing is quicker and simpler than repairing pipeline leaks with Smith Plidco Split-Sleeve. Assemble halves around pipe. Move assembly over leak and tighten side bolts.

Nothing could be safer. Exclusive steel girderings* prevent leaking oil or gas displacing gaskets. Weld if desired.

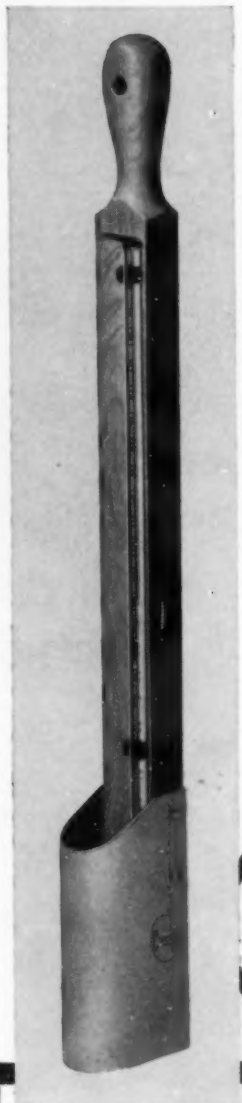
Stock, use Smith Plidco Split-Sleeves and save! Available in standard pipe sizes. Extra lengths, special dimensions on application.

*Patents pending

THE PIPE LINE DEVELOPMENT COMPANY
5700 DETROIT AVENUE - CLEVELAND 2, OHIO
Representatives Throughout the World

Curtin's

NEW VALVE TYPE Tank Thermometer*



Faster, more accurate than standard cup case

The Curtin Valve Type Tank Thermometer incorporates a bucket valve which opens as the thermometer is lowered into the tank, allowing oil to flush through the cup to keep the mercury column at or near exact temperature of oil. When the thermometer is withdrawn, the bucket valve closes, retaining a sample from the desired level.

Permanent EVERLAST® Graduations are etched in the glass and filled with special pigment—can never fade, peel or dissolve since they are actually *fused* into the glass itself.

Easy to Read—mercury column appears red when viewed through lens-type scale.

Guaranteed Accurate—to within one scale division.

Meets ASTM Specification El.

Finest Hardwood Case resists warping and cracking. Friction clips hold thermometer tube tight but permit easy tube replacement.

* Patent Applied For

Curtin Valve Type Wood Case Tank Thermometers		
16764A2	−30 to 120°F ..... Each	6.50
16764A4	0 to 180	6.50
†16764A6	20 to 260	6.90
16764A8	170 to 500	7.50

†Conforms to ASTM specification except for range.

For more information write W. H. Curtin and Company, P. O. Box 118, Houston 1, Texas. Ask for Bulletin TH-461.

W. H. CURTIN & CO.

CURTIN

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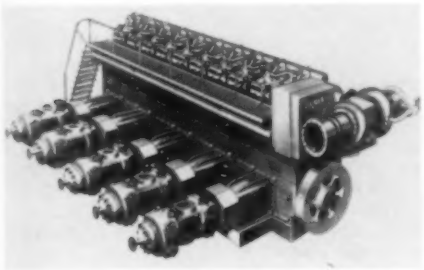
DALLAS • JACKSONVILLE • ATLANTA • CORPUS CHRISTI
CURTIN DE MEXICO, S.A. DE C.V., MEXICO, D.F.

Gas Analysis System

A gas analysis instrument for natural gas, LPG and petrochemicals has been introduced by American Systems Incorporated. The portable unit is designated the Austin Gas Titrator Model 3013 and provides rapid measurement of the major sulfur compounds.

Packaged in a modular aluminum case and powered by an expendable wet battery, the instrument employs an electrochemical cell for reagent generation, with a polarized electrode system for detection of titration end point. The units are applicable for corrosion control, odorant analysis, and process control analysis.

For more data, circle **No. E18** on Readers' Service Card, last page this issue.



Angle Compressors

Clark Bros. Co. announces development of a modified TLA compressor line for 1,500 to 3,000-horsepower range. Designated Model TBA the units will be built in 5, 6, 8 and 10 cylinder models rated at 1,500, 1,800, 2,400 and 3,000-hp.

Main and connecting rod bearings are aluminum type and a full flow five micron oil filter has been added to the lube system. The turbocharger is jet air started, fully automatic and self-sustaining at normal operating speeds.

(This item supplements Clark Bros. Co. data on page 72 of the Pipe Line Catalog, Third Revision)

For more data, circle **No. E19** on Readers' Service Card, last page this issue.

One of Pentzien's 24-inch wide Swing Sling lowering-in belts is shown lifting a 24-inch O.D. concrete-coated pipe. This operation was at Renovo, Pa., where Pentzien laid a main and auxiliary line under the Susquehanna River for the Texas Eastern Transmission Corporation.

For Pentzien, Inc.,
The **Swing Sling*** *is a real money saver*

"We use CF&I-Wickwire's Swing Sling as a lowering-in belt on pipe-laying operations because it saves us money on pipe repairs and sling replacements," says Forrest H. Andrews, Field Superintendent of Pentzien, Inc., Omaha.

Swing Slings are covered with neoprene blocks that provide equal distribution of weight and prevent the belt edges from cutting into the surface of coated pipe. Mr. Andrews says, "When we used other belts, we continually had to make repairs to damaged surfaces that cost up to $75 in labor and lost production each time. The Swing Sling has eliminated all that."

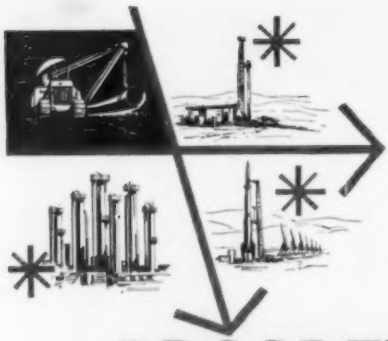
The neoprene blocks protect the rugged steel cable itself from the abrasive action of concrete-covered pipe. As a result, Mr. Andrews expects the Swing Sling to give him at least twice the service of any belt previously used. He also claims that his Swing Sling's 24-inch surface is wide enough to make the pipe self-centering during lowering-in, thus facilitating lining-up and welding operations.

The Swing Sling is available in five "pipeline" models — widths 12", 18", 24", 30" and 36"—and any length over 4'. For complete details, contact your CF&I-Wickwire sales office or distributor.

*trademark—Patent Pending

The Colorado Fuel and Iron Corporation
Denver · Oakland · New York
Sales Offices in Key Cities

CF&I STEEL MADE IN U.S.A.



BROADER HORIZONS...

The work of Burden in the North American Pipe Line System Construction field is well known. With the broadening of the world petroleum and gas industry Burden has been actively engaged in work abroad and is now in position to contract for work anywhere.

O. R. BURDEN CONST. CORP.

* PIPELINE CONSTRUCTION AND RECONDITIONING DRILLING / REFINERY, CHEMICAL PLANT AND MISSILE BASE CONSTRUCTION THROUGH WHOLLY-OWNED OR AFFILIATED COMPANIES.

P. O. BOX 5216/TEmple 8-3378/TULSA, OKLAHOMA

Look At The Many Cost-Cutting Jobs These Versatile Products Can Do

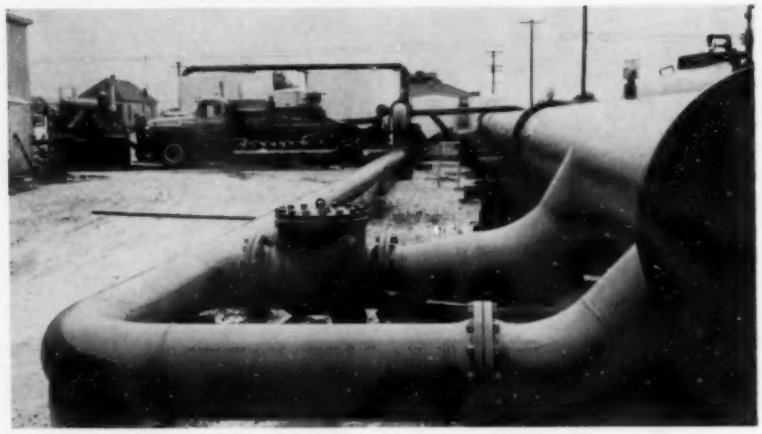
WELDING SLEEVES . . .
The easy, economical way to achieve an all-welded line . . . well-made for good fit . . . available for collars, regular or dresser couplings.

HALFSOLES . . .
The sure, economical way to repair or reinforce a line without costly shutdowns . . . use as a cradle for above-ground lines, or a drain tile trough.

Concrete Pipeline Posts . . .
The strongest post made . . . guaranteed against shipping damage.

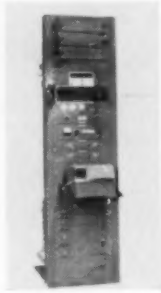
Write today for free 16 pg. catalog

Allan Edwards, Inc.
the nation's oldest manufacturer of concrete river weights
P.O. BOX 7218 — TULSA, OKLA.



Modular Data System

A data system that measures, converts, transmits, and records analog values in digital form has been developed by Monitor Systems, Inc. It is of modular "building block" design throughout and utilizes standard field-proven components.



The system automatically scans and measures inputs from transducers located at remote sites, converts this information into digital form and telemeters it to a central control station where it is recorded. On automatic operation, measurement and transmission of data is initiated in a predetermined sequence by digital timing clock.

For more data, circle **No. E20** on Readers' Service Card, last page this issue.

Mechanical Seal

A new mechanical seal designed to serve high pressure conditions has been developed by Durametallic Corporation. This seal features seal ring with tung-car sealing face and insert with balance slots. The seal is designed for pressure of 600 to 2000 psi and peripheral speeds up to 5,000 ft/minute.

The Type HPTO dura seal is a single, inside, balanced mechanical seal of ultra-heavy duty construction. It utilizes tung-car sealing member mated with Cura #5 carbon. Carbon face is designed with specially engineered slots to provide a sturdier bearing face.

For more data, circle **No. E21** on Readers' Service Card, last page this issue.

Cold Applied Coating

Koppers Company, Inc., announces that Bitumastic No. 505 a new cold-applied, fast-drying, heavy-duty, self-priming coal-tar base coating is available.

Coating is composed of tar base pitch blended with solvents. Ingredients do not settle while in storage and material requires a minimum of agitation prior to application. Rate of application is 50-70 square feet per gallon. Average coverage of 60 square feet per gallon is designed to surface dry in approximately 45 minutes to one hour, depending on weather conditions.

For more data, circle **No. E22** on Readers' Service Card, last page this issue.

Piston Pipe Prover

J. A. Halpine & Son, Inc., has completed a piston pipe prover system consisting of a 36-inch steel tube 160 feet long with a 16-inch manifold valve that directs flow. System incorporates a Helmor tachometer or pulse generator driven by the meter that generates 1,000 pulses per revolution of the meter shaft. A piston barrel and associated switching manifold, two Halmor piston switches, one electric counter and the meters requiring calibration are included in the system. Proving cycle can be made automatic by adding one electric operator.

Design permits checking valves individually for leakage, without their removal.

For more data, circle **No. E23** on Readers' Service Card, last page this issue.

Load Cell

A hydraulic load cell designed for use with a dynamometer to measure tension or compression loads, has been developed by The A. H. Emery Company. The cell is a piston-cylinder assembly in which the compression load on the cell is exerted through the piston on a film of oil. A long-stroke molded diaphragm is used to provide a leak-proof pressure seal. Output hydraulic pressure of the cell is directly proportional to applied load.

In use with the dynamometer, the cell is equipped with a strut bolted to the piston part of the cell. Strut is then attached to the torque arm of dynamometer and torque is measured in either direction of rotation.

For more data, circle **No. E24** on Readers' Service Card, last page this issue.

Transfer Switches

Automatic Switch Company announces that the mechanically held automatic transfer switches are now manufactured in 1200, 1600, and 2000 amper sizes. These two and three pole switches are catalog listed to 600 volts AC, 250 volts DC.

The switches are open type, minimum width, vertical tandem type, and are particularly suitable for control centers. Full relay protection on each switch provides for transfer to the emergency source when voltage on phase drops to 70 percent or less.

For more data, circle **No. E25** on Readers' Service Card, last page this issue.

Centrifugal Pumps

Featuring faster self-priming, increased capacities and pressures and improved hydraulic design, the new 5 and 7 series centrifugal pumps have been announced by Barnes Manufacturing Company. The manufacturer claims pressure characteristics of 2,400 gph at 95 feet of head and 40 psi.

A built-in venturi priming principle speeds flow of air entrained liquid through volute pumping chamber for the top air separation chamber for instant purging of air, assuring high speed priming in only 16 seconds.

For more data, circle **No. E26** on Readers' Service Card, last page this issue.

Combination Coating

A coating system consisting of asphalt coating and primer has been developed by Lion Oil Company Division of Monsanto Chemical Company.

The primer and asphalt coating are being marketed under brand names of Lion 5-A-60 and Lion E-120-A respectively. The rapid drying primer is designed to improve adhesive qualities resulting from its surface-wetting properties.

For more data, circle **No. E27** on Readers' Service Card, last page this issue.

Color-Coded Plastic

W. S. Shamban & Co. has put its material, Universal Thread Seal, in color-coded, crush-proof plastic spools. The Shamban Teflon spools are available in three spools of 100, 260 and 520 inches of tape in yellow, black and white spools respectively. The product is designed for use on pipe lines, valve stems, flared tubular joints and hydraulic and pneumatic pressure line applications on farm and earth moving equipment.

For more data, circle **No. E28** on Readers' Service Card, last page this issue.

Tank Valve

A.P.V. tank valve has been introduced by Instruments, Inc. It is designed to simplify and economize tank hook-up. The valve eliminates reducing to match tank connections; its cross type body design replaces the pipe tee normally required for tank hook-up; it has unobstructed full flow internal design and is available in 2, 3 and 4-inch grooved or threaded connections.

For more data, circle **No. E29** on Readers' Service Card, last page this issue.

Transistorized Vibrator

Developed to trim the maintenance cost of two-way radios, a transistorized vibrator has been introduced by Custom Electronics Manufacturing Co.

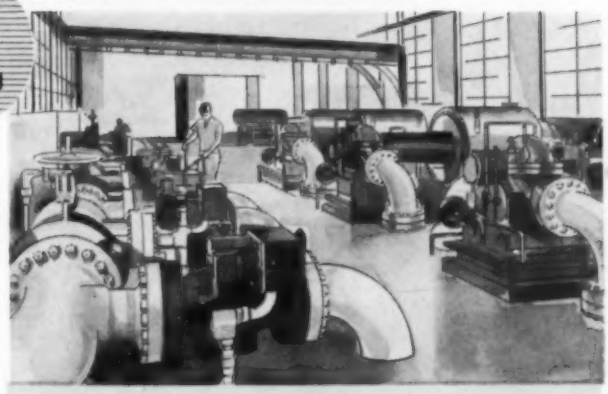
Sensitivity of the receiver is always at a high level, because transistorized vibrators do not deteriorate with use. All weather operation is another feature of the unit. The circuitry consists of a conventional power oscillator with a de-spiker to protect transistors. Short circuits do not bother the vibrator. It only stalls-out or turns itself off, which protects the mobile unit from further damage.

For more data, circle **E30** on Readers' Service Card, last page this issue.

A Solution to Pipeliner Problems

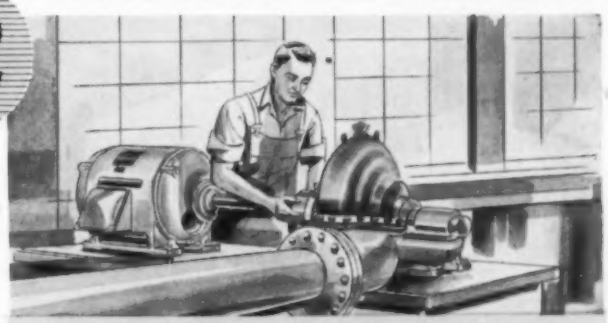
John Crane 8-B SHAFT SEAL

1 ON HIGH PRESSURES



Specially engineered hydraulically balanced construction permits handling of all pressures encountered in modern pipe lines. Pipeliners report that 8-B Seals in continuous main line pump service for more than 44,000 hours are still in perfect working condition.

2 ON MAINTENANCE MAN-HOURS



8-B Seals are quickly installed. Removal of the top casing on split case pumps is not necessary Simply slide the entire unit along the shaft into position Once installed, little or no attention is required. Service-life is long. No messy leakage.

The 8-B Seal is available in a full range of shaft sizes for every main line or tank farm pump service.

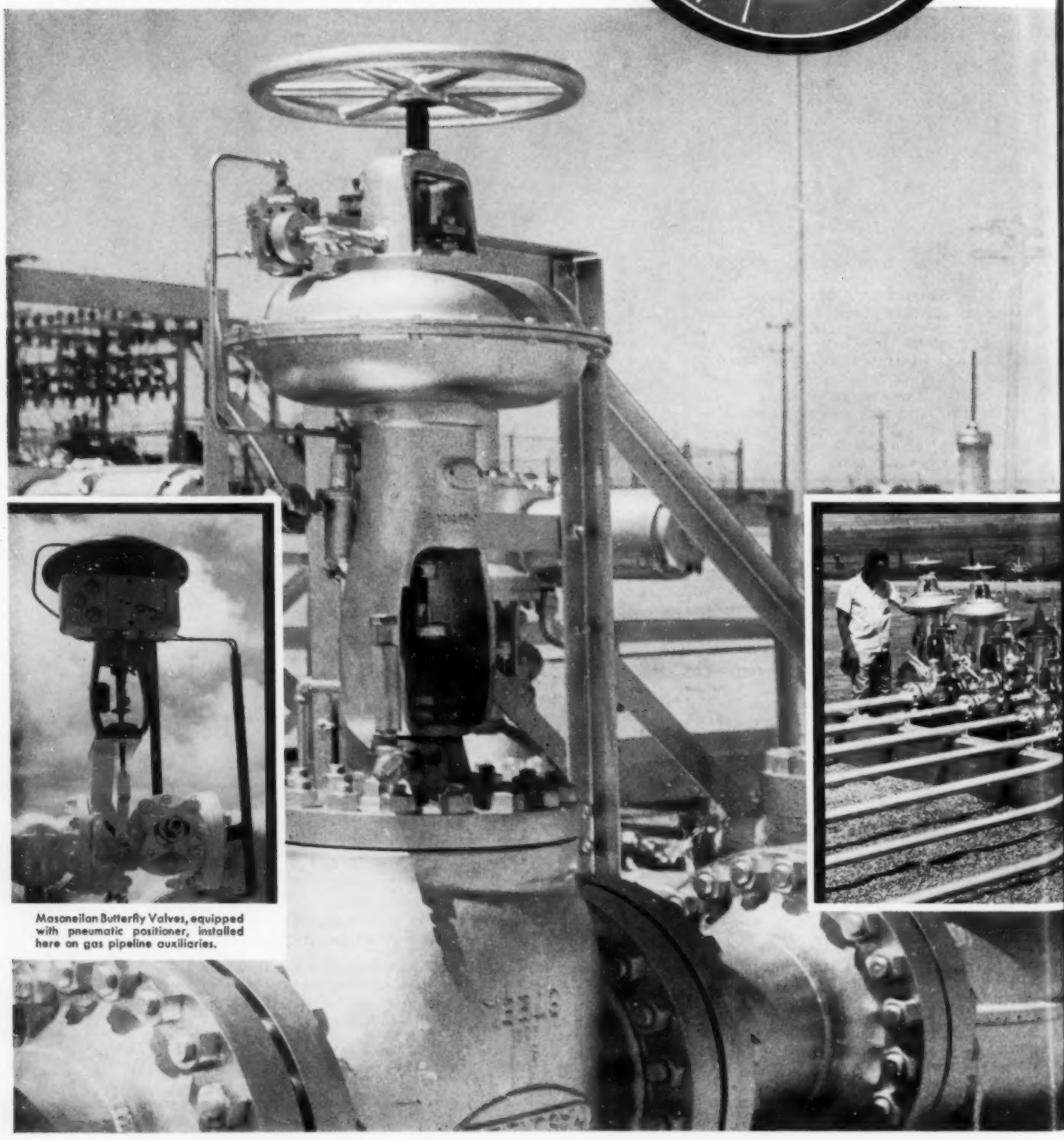
For general information request Bulletin S-215-1. Give mechanical specifications and service details for specific recommendations

Crane Packing Co., 6434 Oakton Street, Morton Grove, Illinois, (Chicago Suburb). *In Canada Crane Packing Co., Ltd., Hamilton, Ont*

CRANE PACKING COMPANY

Masoneilan Controls for pipelines ...

Masoneilan 10000 Series Control Valves at Pipeline Pumping Station.

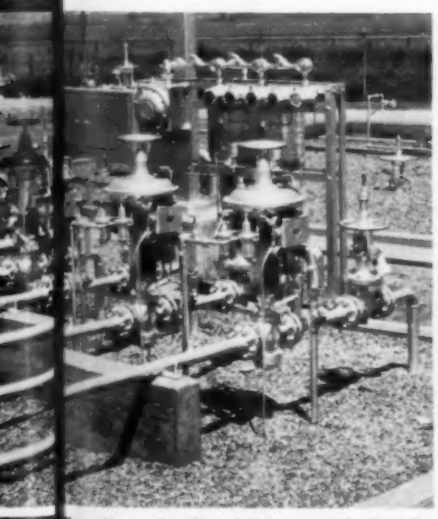


Masoneilan Butterfly Valves, equipped with pneumatic positioner, installed here on gas pipeline auxiliaries.

DEPENDABLE PERFORMANCE FOR PROFITABLE OPERATION

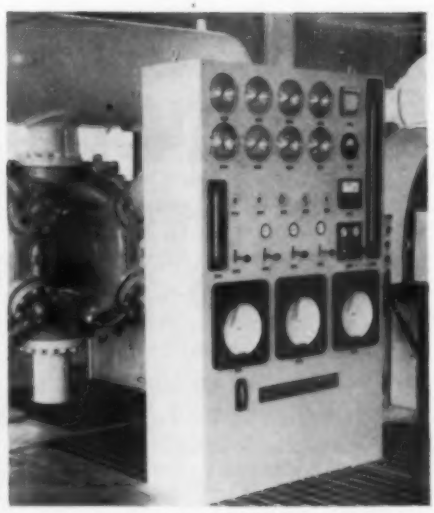
On major pipelines, old and new, all over the world, Masoneilan controls are demonstrating the kind of accurate, reliable performance necessary for profitable operations. Transmitters, controllers and control valves are designed with inherent versatility which permits standard products to be adapted to your special needs with resultant cost savings. Low maintenance requirements effect further economies.

For product data and engineering cooperation, call a Mason-Neilan representative or write direct.



These Masoneilan Control Valves provide flexibility in obtaining desired pressure differential in friction tube bundles at a Pipeline Station.

Masoneilan Percentage Piston Control Valves with Series 2800 Controllers.



Masoneilan 60000 Series Instruments are used to control pressure at Compressor Stations for gas pipelines.

Products that Work for Your Profit

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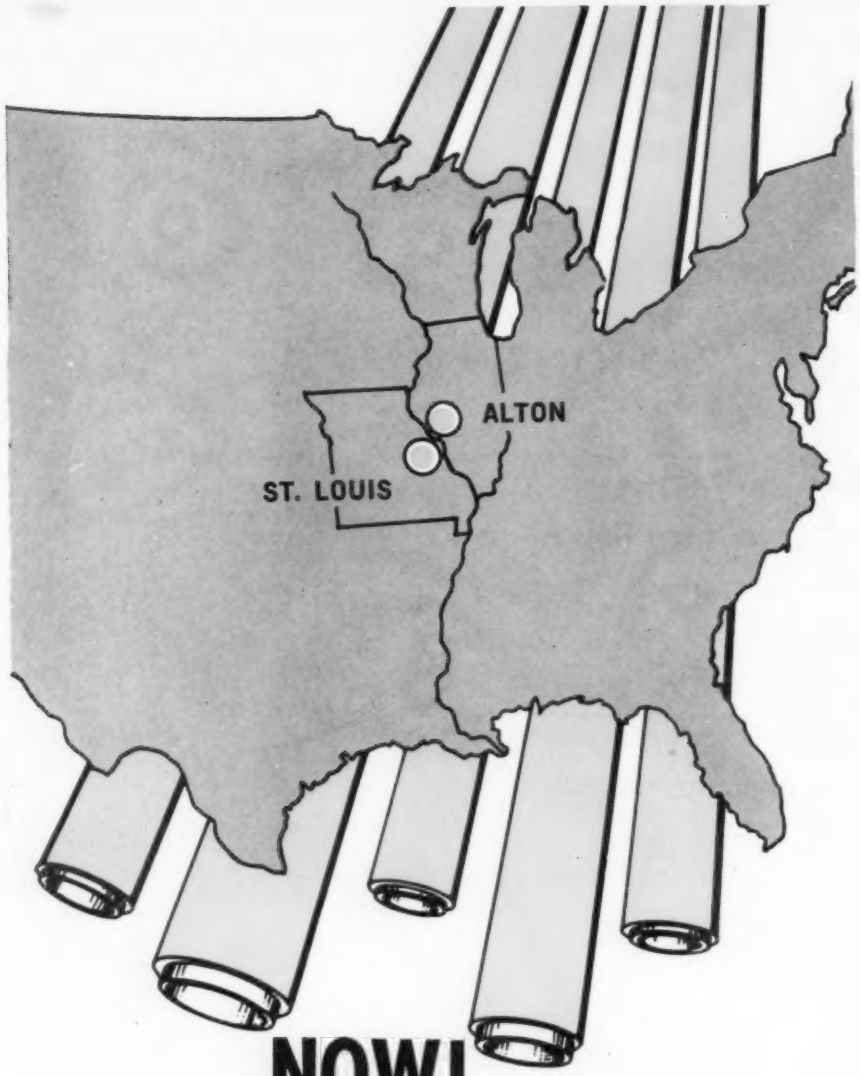

NOW!

from SPI's new Alton, Illinois Plant comes STANDARD X-TRU-COAT

Standard Pipeprotection's new plant at Alton, Illinois has been shipping Standard X-Tru-Coat pipe to the Southwest and West since early July. Sizes available include ¾" Nom. through 4½" O.D.

X-Tru-Coat high density polyethylene plastic coating for pipe is produced under the DeKoron process — Pat. Nos. 2,447,420 and 2,467,642 — and is extruded on pipe over a pressure sensitive adhesive.

Standard Procedures assuring top quality prevail at the Alton, Illinois plant, as they have for many years at SPI's coating and wrapping plant in St. Louis. In-Transit privileges are available at both plants from any pipe mill.

Standard Pipeprotection, with the introduction of X-Tru-Coat, has continued to contribute to the progress of the oil and gas industry.

Write for complete information and for Price List Number X-1.

SP®

standard pipeprotection inc.

3000 SOUTH BRENTWOOD BLVD. • ST. LOUIS 17, MISSOURI

New Literature

Liquid Metering

Rotocyle meters for all liquid metering applications are illustrated and described in detail in a catalog issued by the petroleum and industrial meter division of Rockwell Manufacturing Company.

Specification and dimensions of 14 basic rotocycle meter types permit selection in any size range and capacity from 14 to 1,000 gpm.

To get a copy, circle **No. E31** on Readers' Service Card, last page this issue.

Crane Specifications

A 12-page technical bulletin gives specifications of the recently announced P&H 325-TC truck crane. The Harnischfeger Corporation crane has an independent planetary boom hoist; live roller circle; and torsion bar front axle; plus illustrated data on P&H carrier, all welded frame, and other features.

The portfolio contains specifications on front end attachment, drawings, photographs and on the job illustrations.

To get a copy, circle **No. E32** on Readers' Service Card, last page this issue.

Accumulators

An illustrated reference manual on hydraulic accumulators has been published by Greer Hydraulics, Inc. This is the third edition of the manual which includes operating principles, designs and uses of accumulators.

It was prepared for design engineers and others interested in the field. The booklet contains a history of accumulators and details of all operations of all types accumulators.

To get a copy, circle **No. E33** on Readers' Service Card, last page this issue.

Piston Rings

A 12-page piston ring price catalog for large bore (8-30-inch) diesel and gas engines has been released by Piston Products, Inc.

The booklet includes descriptive application data on various types of piston rings illustrated; also technical information on piston ring materials, and information on Daros Anti-Corrosive cylinder liners.

To get a copy, circle **No. E34** on Readers' Service Card, last page this issue.

Electric Set

Features of Allis-Chalmers Manufacturing Company 20-35 KM "Sure Power" electric set are highlighted in a bulletin released by the Engine-Material Handling Division.

It describes the G-226 gasoline engine that powers the set and the AC brushless generator that is utilized. Important components are illustrated in the three-fold, two-color literature.

To get a copy, circle **No. E35** on Readers' Service Card, last page this issue.

more data on New Equipment or copies Catalogs and Literature reviewed in this ue, use the Readers' Service postcards t inside the back cover and facing the vertisers' Index. Simply circle code num- s of items desired—sign and mail card.

Engine Digest

A power-digest of all White Superior engines has been issued by White Diesel Engine Division of the White Motor Company. The four-page bulletin reviews 26 models of six basic Superior engines, including the G-510, G-825, Model 40-60-65 and Model 80 Series.

Six of the engines are for gas operation, while others can be run on diesel fuel, dual-fuel or gas. Brief description and specifications of each engine are supplemented with references to other literature giving more comprehensive coverage.

To get a copy, circle **No. E36** on Readers' Service Card, last page this issue.

Coating

A four-page bulletin has been released by Sealube Company describing its Zinc Rich Coating. The coating can be brushed or sprayed on iron or steel surfaces to provide galvanic protection against rust and rust creepage.

Bulletin is illustrated showing use of coating applied on several types of structure.

To get a copy, circle **No. E37** on Readers' Service Card, last page this issue.

Turbines

A complete line of single-valve, multi-stage mechanical drive turbines is described in a General Electric Company bulletin.

These turbines come with four, six or new eight-inch inlet valve which can be applied to various applications and flow requirements, condensing and non-condensing, with a wide choice of exhaust orientations. Ratings are up to 4,000 horse power; speeds up to 10,500 revolutions per minute; speed range up to 6:1, and initial pressure up to 850 psig.

To get a copy, circle **No. E38** on Readers' Service Card, last page this issue.

Supervision

Seventh in a series of human relations articles, "Supervision For Professional Advancement" has been issued by Western Supply Company.

This booklet deals with importance of developing good supervisory practices to maintain uninterrupted production and completion of projects successfully and profitably.

To get a copy, circle **No. E39** on Readers' Service Card, last page this issue.

Welding Machines

Lincoln Electric Company has issued a bulletin describing performance features and construction details of a new line of welding machines. The Idealarc R3M 3 phase rectifier type DC arc welder will handle any type of manual welding electrode. In addition, the high capacity model can be equipped for semi-automatic submerged arc welding.

To get a copy, circle **No. E40 on** Readers' Service Card, last page this issue.

NEW ALL-TRANSISTOR CARRIER FAILURE ALARM

Type 256, Model 1 instantly detects and tells you about any signal failure, no matter where it occurs. Installed in a communications system, it detects any loss of signal and immediately lights a lamp on its front panel and actuates the "remote" alarm circuits controlled by contacts of the alarm relay. Gradual signal or power deterioration may also be detected before it gets too serious — by pre-setting the threshold control to the desired level.

Use of transistors makes the unit more compact, reliable, and efficient than has ever before been possible. It is contained in a 7/8" x 5 1/4" x 11 3/4" housing. Internal heat is negligible, and any number of units may be mounted close together without danger of overheating. This is particularly valuable as a separate unit is used for each channel being monitored.

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In Canada: Northern Radio Mfg. Co., Ltd. 1950 Bank St., Billings Bridge, Ottawa, Ontario

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Repair pipe leaks QUICKLY!

Speediest application — slotted lug permits the single plated bolt to slide instantly into place.

A companion to the old reliable Emergency Pipe Clamp that has served industry for a half century, the JUNIOR, a single bolt clamp, is 2⅞" wide. Undersells most band-type clamps.

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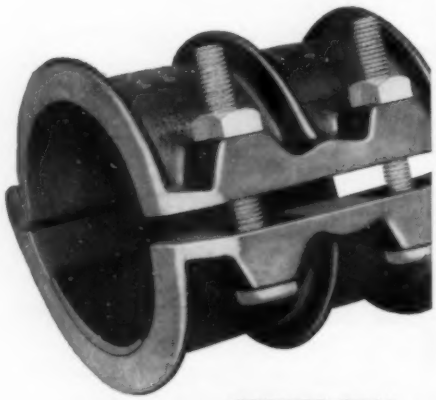

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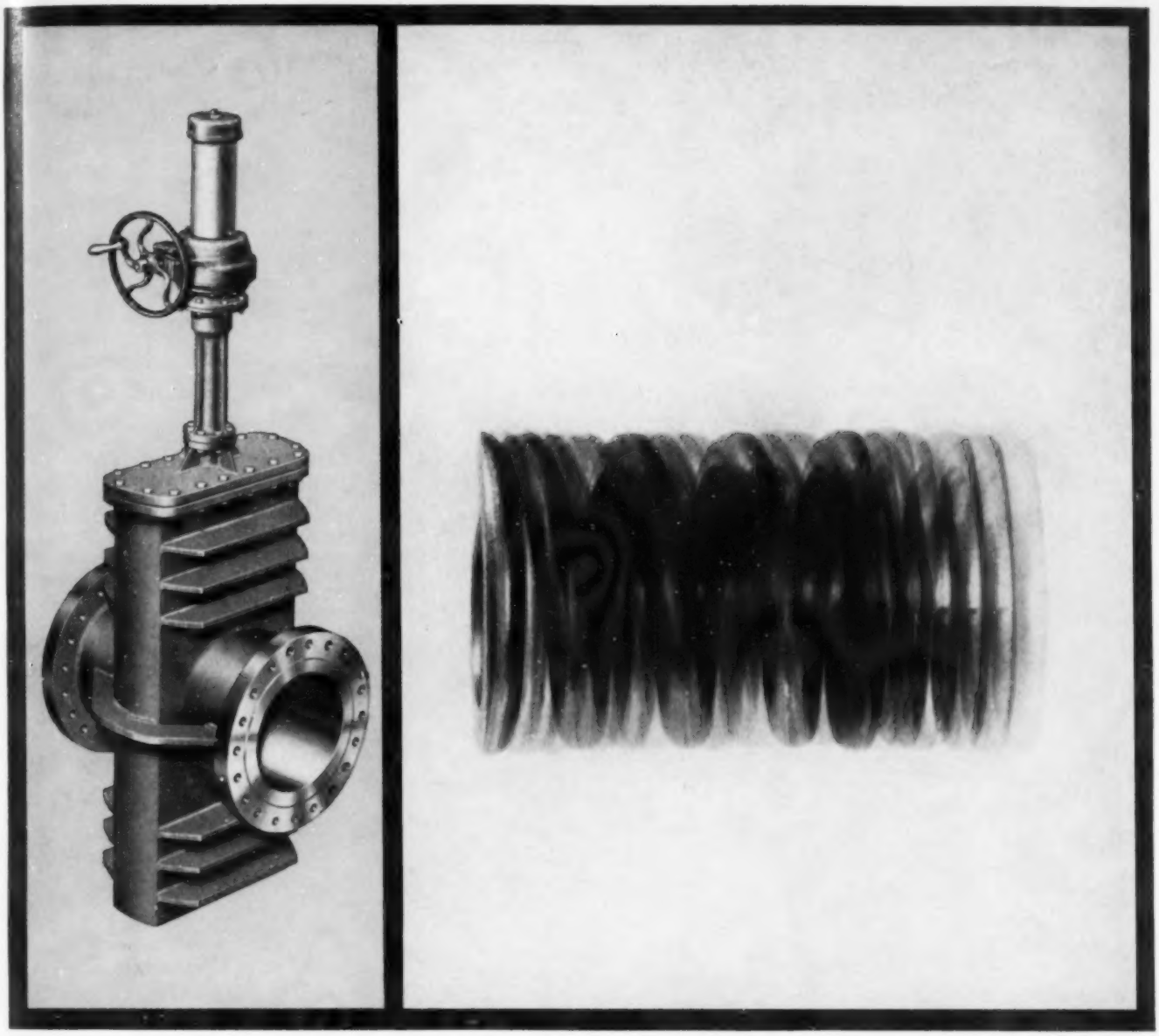

Crane fabricated pipeline valves with the seal that springs into action.

Mounted in any position, Crane's new 150 and 300 Pound fabricated steel conduit pipeline gate valves deliver smooth, turbulence-free flow, and positive, bubble-tight shutoff. This positive, leakproof closing is due to Crane's unique spring-action, floating seal.

Here's how the seal works: Spring-loaded seat ring plates press seat ring against disc for the primary seal. Line pressure forces disc tightly against downstream seat ring, and achieves a double sealing action by forcing the upstream seat ring against the disc. As an added safety feature, spring control permits excessive pressure in the valve body to bleed off into the line.

Incorporating field tested and proven features developed for Crane's 400 and 600 Pound cast steel full-way conduit-type gate valves – the new Class 150 and 300 fabricated steel valves are first choice for every petroleum and gas pipeline service.

Available 14" to 30" with flanged, butt-welding or flanged-by-welding ends. Catalog Nos. 150 pound–1190TF (flanged), 1191TF (butt-welding); 300 pound–1390TF (flanged), 1391TF (butt-welding). Meet all applicable ASA and API specifications. With handwheel, bevel gear, electric motor or cylinder operator.

For complete details contact your Crane Distributor, or write: Crane Co., Industrial Products Group, Dept. R, 4100 So. Kedzie Ave., Chicago 32, Ill. In Canada: Crane, Ltd., 1170 Beaver Hall Square, Montreal.

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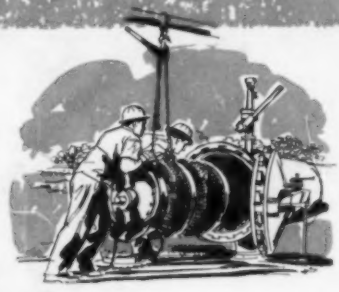
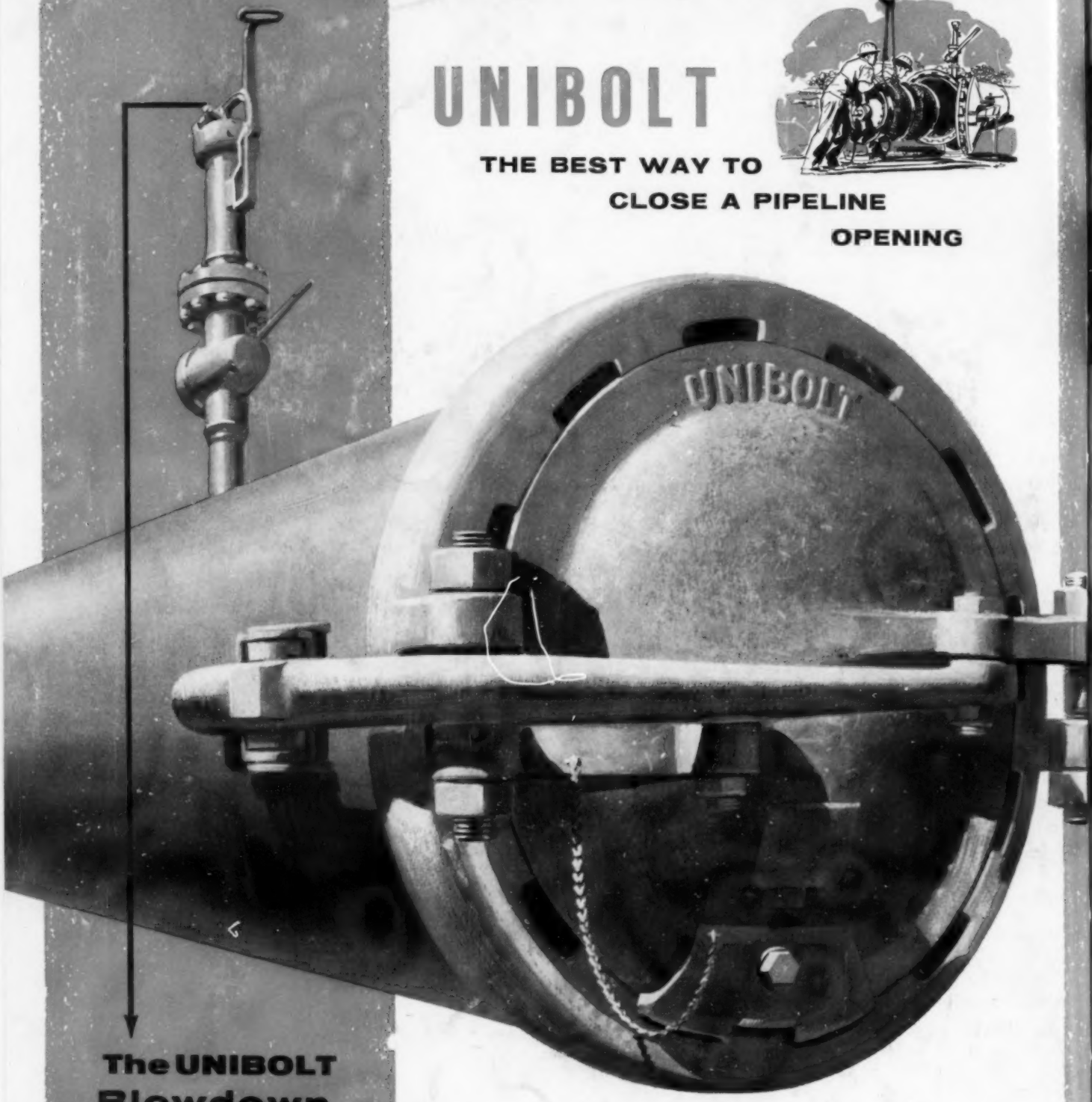


THE BEST WAY TO CLOSE A PIPELINE OPENING



The UNIBOLT Blowdown

is equipped with a UNIBOLT Closure on a cantilever hinge for easy opening. A bleeder plug is provided for safely relieving pressure that may leak thru the riser valve.

UNIBOLT Hinged Scraper Trap Closures are easier to open—only two bolts to release. No heavy lifting, nothing to fall on workmen. They are the safest of all closures. The nut-lock must be released before the closure can be opened, and releasing the nut-lock automatically bleeds off any pressure that may be trapped in the line. They swing open and shut on a sturdy hinge. An oil-resistant, resilient, self-sealing gasket provides a pressure-tight seal and seldom, if ever needs replacement. Overtightening the closure bolts cannot damage the gasket.

Complete details and specifications on these and other UNIBOLT products for the pipeliner are carried in Bulletin PL-600, a copy of which will be sent on request.

UNIBOLT

THORNHILL CRAVER CO.

P. O. Box 1184, Houston, Texas